K.K. UNIVERSITY

NALANDA, BIHAR-803115

SCHOOL OF APPLIED SCIENCES

Bachelor of Science (B.Sc.)

(Three Year Full Programme)

2022-2023

PROGRAMME STRUCTURE & SYLLABUS

K.K. UNIVERSITY 803115 NALANDA

Pro Vice Chancellor
KK University
Berauti, Nepura, Bihar Sharif
Nalanda - 803115 (Bihar)

B.Sc. ZOOLOGY

B.Sc. Zoology (Hons.) - Program Structure - Total Credit - 118						
B.Sc. Zoology (Hons.)						
Semester : I						
S.No.	**Subject Code**	**Subject Name**	**L**	**T**	**P**	**Total Credit**
1	BSZG-1101	BIO DIVERSITY-I	3	1	0	4
2	BSBT-S-1101	BOTANY-I	2	1	0	3
3	BSCH-S-1101	CHEMISTRY-I	2	1	0	3
4	HNL-1101	HINDI-I	2	0	0	2
5	BSZG-1101P	PRACTICAL : BIO DIVERSITY -I	0	0	6	3
6	BSBT-S-1101P	PRACTICAL: BOTANY -I	0	0	4	2
7	BSCH-S-1101(P)	PRACTICAL : CHEMISTRY - I	0	0	4	2
						19
semester : II						
S.No.	**Subject Code**	**Subject Name**	**L**	**T**	**P**	**Total Credit**
1	BSZG- 1201	BIO DIVERSITY-II	3	1	0	4
2	BSBT-S- 1201	BOTANY-II	2	1	0	3
3	BSCH-S- 1201	CHEMISTRY-II	2	1	0	3
4	ENG 1201	ENGLISH -I	2	0	0	2
5	BSZG-1201P	PRACTICAL : BIO DIVERSITY-II	0	0	6	3
6	BSBT-S- 1201P	PRACTICAL : BOTANY-II	0	0	4	2
7	BSCH-S-1201P	PRACTICAL: CHEMISTRY -II	0	0	4	2
						19
semester : III						
S.No.	**Subject Code**	**Subject Name**	**L**	**T**	**P**	**Total Credit**
1	BSZG - 2101	CHORDATA EVOLUTION AND TYPE STUDY	3	1	0	4
2	BSBT -S- 2101	BOTANY -III	2	1	0	3
3	BSCH-S- 2101	CHEMISTRY-III	2	1	0	3
4	HNL 2101	HINDI-II	2	0	0	2
5	BSZG-2101P	PRACTICAL : CHORDATA EVOLUTION	0	0	6	3
6	BSBT-S-2101P	PRACTICAL : BOTANY-III	0	0	4	2
7	BSCH-S-2101P	PRACTICAL : CHEMISTRY -III	0	0	4	2
						19

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B.Sc. Zoology (Hons.)

Semester : I

BSZG-1101 : BIO DIVERSITY – I

Bionomics general characters and classification (up to orders) of the following Phyla:
Protozoa, Peripheral, Cnidarian, Ctenophore, Platyhelminthes As helminthes.
Detailed study of the following types:

1. Protozoa : Paramecium Parasitic protozoans and their modes of infection Polystomelia (Elphidium).
2. Porifera: Sycon, Cannal system in sponges, affinities of the phylum.
3. Cnidaria : Obelia, Aurelia Sea anemone.
4. Ctenophora: General Organization of Hormiphora affinities of the phylum.
5. Platyhelminthes: Fasciola hepatica. Teania sodium and Planaria.
6. Aschelminthes: Ascaris lumbriocoides, Wuchereria bancrofti.
7.

HNL – 1101: HINDI –I

- Hindi Bhasha ke Vibhinna Roop – Rashtra bhasha, Rjabhasha, Janbhasha.
- Tippan, Aalekhan, Sankshepa, Sarkari patra ke prakar, paribhashik shabdawali.
- Anuvaad ki paribhasha, prakar, Upyogita aur mahatva, Achhe Anuvaad ke Gun, Anuvaad prayog (Hindi se English me Anuvaad).
- Sabhashan Kala ka Artha, Sambhashan ke Vibhinn Roop – Vaartalap, Vyakhyan, Vaad-Vivaad, Ekaalap, Avaachik Abhivyakti, Jan Sambodhan, Sambhashan Kala ke Upaadan- Bhasha Gyan, Antaraal Dhwani (Volume), Lahaja (Accent).
- Sambhashan Kala ke Vibhinn Roop – Udgoshana, Sanchalan, Aankho Dekha Haal, Vachan Kala, Vaad- Vivaad Pratiyogita, Samuh samvaad.

Suggested Readings:

1. Karyalayeeya Hindi – Dr. Kailashnath Pandey – Prabhat Prakashan, New Delhi.
2. Prayojanmulak Hindi – Prayukti aur Anuvaad – Madhav Sonatakke
3. Anuvaad Vigyan – Bholanath Tiwari
4. Bhashan aur Sambhashan ki Divya shakti – Shri Ram Sharma Aacharya – Yug Nirman Yojana Press, Mathura.

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5. Bhashan Kala – Dr. Mahesh Sharma – GyanGanga Delhi.

BSCH-S -1101: CHEMISTRY - I

UNITS	CONTENTS	Contact Hrs.
1	**Physical Chemistry** **Gaseous State** (a) Kinetic Theory of gases, Derivation of kinetic gas equation, deduction of gas law, calculation of gas constants and kinetic theory. (b) Types of solids, crystal forces, law of constancy of angles, seven crystal systems, law of rational indices, Bragg's Law, Lattice energy, Born-Haber cycle	
	Thermochemistry (a) Heat in chemical reactions, Reaction enthalpy, standard enthalpy changes. (b) Hess Law, Kirchoff Law (c) Bond energy and determination	
	Ionic Equilibrium (a) Ionic Product of water, pH, pK_a, pK_b, pK_w (b) Buffer solution, Idea of buffer solution in everyday life. (c) Solubility product and it application in salt analysis. (d) Specific conductance, Molar conductance, Equivalent conductance.	
II	**Inorganic Chemistry** **Atomic Structure and Bonding** (a) Features of H-spectra and Bohr's theory. (b) Shapes of orbital's and their labeling, idea of quantum number (c) Pauli's Exclusion Principle, Hund's rule, Aufbau Principle (d) Electronic configuration of elements (e) Idea of ionic and covalent bonds, Ionization potential, Electro negativity, Electron affinity, Fajan's rule **Chemistry of the following elements** Li, Sn, Fluorine, Chlorine, Iodine	
III	**Organic Chemistry** **Structure and Mechanism** (a) Hybridization, bond angle, bond length, idea of bonds. (b) Inductive effect, electrometric effect, mesmeric effect (c) Bond fission and products.	

BSCH –S- 1101 (P) : CHEMISTRY –I LAB

PRACTICAL	
1.	Inorganic chemistry Volumetric Analysis (a) Acidimetric and alkalimetry (b) Use of Potassium permanganate and potassium dichromate (c) Iodometry

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2.	Note book and Viva voce.

BSCH –S- 1201 : CHEMISTRY –II

UNITS	CONTENTS	Contact Hrs.
1	**Physical Chemistry** **Chemical Kinetics** (a) Rate of reaction, order and molecularity. (b) Expression for specific rate constant of first order reaction. (c) Half-life period and Units	4
	Colligative Properties (a) Osmosis and its determination. (b) Vapour Pressure (c) Raoult's law of lowering vapour pressure (d) Relation between osmotic pressure and lowering of vapour pressure.	4
II	**Inorganic Chemistry** Principles involved in the volumetric and gravimetric estimation of Cu and Fe. Isotopes: Brief idea of detection and separation, Radiocarbon dating .	4
III	**Organic Chemistry** **Nomenclature** (a) IUPAC Nomenclature of aliphatic and aromatic compounds Chemistry of monohydric alcohol and Grignard reagent Idea of purification of compounds, Chromatography	4

BSCH –S- 1201 (P): PRACTICAL : CHEMISTRY – II

PRACTICAL	
1.	Organic chemistry Detection of nitrogen sulphur and halogen in organic compouns Detection of following functional group of organic compounds (a) OH (Phenolic) (b) CHO(c) = O (d) COOH (e) NH_3 and NO_2

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3.	Note book and Viva voce.

BSCH –S- 2101 : CHEMISTRY –III

UNITS	CONTENTS	Contact Hrs.
1	**Physical Chemistry** **States of Matter** (a) Van der Waals equation, critical constants, collision frequency, mean free path. (b) Idea of lattice planes, stoichiometric and non-stoichiometric defects in simple ionic solid	4
	Thermodynamics (a) Extensive and Intensive system. (b) First and second law of thermodynamics (c) Carnot cycle	4
II	**Inorganic Chemistry** **Atomic structure and bonding** Atomic structure and bonding (a) De Broglie waves (b) Schrodinger wave equation (c) Idea of overlap and hybridization (d) Metallic bonding (e) Double salts and complex salts (f) Werner's theory	4
	Introduction to the transition metal complex Variable oxidation states, magnetism	
III	**Organic Chemistry** **Structure and Mechanism** (a) Different types of isomerism (b) Elementary and nucleophilic substitution at saturated carbon	4
	Natural Products	

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	(a) Carbohydrates (b) Elementary idea of Alkaloids and Terpenoids	

BSCH-S- 2101 (P) : PRACTICAL : CHEMISTRY –III

PRACTICAL	
2.	**Inorganic chemistry** **Qualitative inorganic analysis of mixtures containing Acid and Basic radicals** **Basic radicals : Pb^{2+}, Cu^{2+}, Fe^{2+}, Fe^{3+}, Cr^{3+}, Ni^{2+}, Co^{2+}, Zn^{2+}, Mg^{2+}, Na^{+}, K^{+}** **Acid radicals: CO_3^{2-}, SO_3^{2-}, S^{2-}, SO_4^{2-}, NO_2^{-}, NO_3^{-}**
4.	**Note book and Viva voce.**

BSCH-S- 2201 : CHEMISTRY –IV

UNITS	**CONTENTS**	**Contact Hrs.**
1	**Physical Chemistry** **Ionic Equilibrium** (a) Oswald's dilution law (b) Salt Hydrolysis (c) Theory of acid – base indicator	4
	Chemical Kinetics (a) Second order reaction, expression of rate constant. (b) Effect of temperature on reaction rate (c) Arrhenius equation	4
	Inorganic Chemistry (a) Chemistry of Group 4 elements (b) Idea of Major pollutants in environments	4

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II	**Chemistry of Fe, Cr, Ni compounds**	
III	**Organic Chemistry** Structure of Benzene and benzene Diazonium chloride	4
	Brief idea of Polymers, resins, drugs	

BSCH-S- 2201P : PRACTICAL : CHEMISTRY –IV

PRACTICAL	
1	**Organic chemistry** **Preparation of Organic compounds by using following reactions:** **(a) Acetylation of Aniline** **(b) Oxidation of benzaldehyde** **(c) Hydrolysis of esters**
2	**Note book and Viva voce.**

BSZG-1] 0 1P; PRACTICAL: BIO DIVERSITY -1

1. **Taxonomy:**

Phylum: Protozoa – Euglena, Amoeba, Plasmodium, Paramecium.P da

Phylum — Porifera — Sycon, Hyolonema, Spongilla

Phylum: Coelenterata – Hydra, Physalla, Aurelia,Sea Anemone

Phylum : Platyhelminthes — Planaria, Fasciola, Taenia, Scolex of Taenia

Phylum: Aschelminthes- Ascaris

2. Dissection

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3. Permanent stained preparati . obeliacolony. paration of the following: Paramecium gemmules, Spicules, Obeliacolony.

4. Spotting:

(i) Museum specimens

(ii) (ii) Slides

(iii) (iii) Specimens relating animal behavior

BSBTS -1101P: PRACTICAL: BOTANY-I

Morphology and structural details of the forms prescribed in the syllabus and their temporary stained microscopic slide preparations.

Pteridophyte

Algae

Bryophyte

Lichen/Fungi

Semester : II

BSZG-1201: BIO DIVERSITY – II

Bionomics general characters and classification (up to orders) of the following Phyla: Annelida Arthoropoda, Mollusca, Echinodermata and Hemichordate.

1. Annelida: Pheretina posthuma, Leooh, Nereis.
2. Arthropoda: Paloomon, Peripatus, Adaptive variations in insect mouth parts, Sacculina.
3. Ectoprocta: Bugula,
4. Mollusca: Unio, Pila, Sopia, Torsion and distortion in Gastropoda.
5. Echinodermata: Larval forms in Echinoderms, water Vascular System in Echinoderm.

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BSBT-S -1201: BOTANY- II

MICROBIOLOGY AND PLANT PATHOLOGY

1. Historical background of Microbiology.
2. Techniques of isolation for micro-organisms and culture media preparation.
3. Modern concepts about bacterial cell.
4, Structure and nature of TMV and Bacteriophage.
5. Role of microbes in nitrogen fixation.
6. Industrial Importance of bacteria and fungi.
7. Microbial degradation of agricultural produce in storage.
8. Role of Toxins and Enzymes in Plant Diseases.
9. Important plant diseases of Bihar, Etiology, symptoms and control of the following diseases:

(a) Late blight of potato (b) Loose smut of wheat

(c) Rust of linseed (d) Red rot of sugarcane

(e) Citrus canker (f) Tobacco mosaic virus

(g) Tundu disease of wheat (h) Little leaf of brinjal.

10. Transmission of Plant viruses and control measures

ENL-1201: ENGLISH - I

I. Prose:

1. The Bet — Anton Chekov
2. Socrates and the Schoolmaster — F. L. Brayne
3. An Astrologer's Day — R. K. Narayan
4. The Gift of the Magi — O' Henry
5. With the Photographer — Stephen Leacock

II. Spoken Communication:

1) Meeting People, Exchanging Greetings and Taking Leave
2) Introducing Yourself
3) Introducing People to Others
4) Answering the Telephone and Asking for Someone
5) Dealing with a Wrong Number

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6) Taking and Leaving Messages

7) Making Inquiries on the Phone

8) Calling for Help in an Emergency

II. Grammar and Vocabulary: Articles, prepositions, modal auxiliaries, antonyms, synonyms, one-word substitutes.

IV. Written Communication: Summarizing

BSBT8 -1101: BOTANY-I

CRYPTOGAMS

Algae: (1) General characteristics & classification of algae, (2) General characteristics of Cyanophyceae with reference to Oscillatoria and Rivularia, Nostoc, Anabaena, (3) Structure and life history of the following genera with reference to alternation of generation: Volvox, Ocedogolnium, Coleochaete, Chara, Ectocarpus, Fucus, Batrachospermum and Polysiphonia. (4) Study of Economics importance of Algae.

Fungi: (1) General Characters classification and Economic importance of Fungi, (2) Structures and life history of the following genera : Synchytrium, Albugo, Erysiphe, Peziza, Ustilago, Puccinia, Alternaria, & Cercospora.

Lichen: General Account.

Bryophytes : (1) General characteristics, classification and Economic importance of Bryophytes. (2) Structures and life history of the following genera with reference to comparative studies of gametophytes and sporophytes: Marchantia, Pellia, Anthoceros, Sphagnum and Polytrichum.

Pteridophytes : (1) General characters and classification. (2) Stelar evolution. (3) Structures and life history of the following: Psilotum, Lycopodium, Selaginella, Equisetum, Marselia and Azolla.

Fossils : Study of Rhynia, Lepidodendron and Calamites.

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BS7G-1201P: PRACTICAL: BIO DIVERSITY -II

1.Tanonomy:

Annelida, Atthoropoda, Mottusca, Echinodermata and Hemichordate.

2. Dissectum:

Pheretsma, Leech-Alimentary canal, Reproductive, Excretory and Nervous systems.

Palsemon - Alimentary canal, Nervous system. Uno Pila and SepiaNervous system, organs of Pallial complex of Pila.

3. Permanent stained preparation of the following:

Nephnidia and Ovary of Pheretima, Jaw of Leech, Statocyst of prawn, osphradium, radulla wil of pila of unio, Glochidium larva, of crustace and Echinoderma, Pediceralia.

4, Spotting:

(i) Museum specimens

(ii) Slides

(iii) Specimens relating animal behavior or parental care.

BSBTS -1201P: PRACTICAL: BOTANY -II

1. Study of bacterial and viral diseases and staining technique of Gram (+) and Gram (-)bacteria, **Or** Preparation of a solid culture medium. **Or** Technique of isolation and inoculation of fungi.

2. Study of local fungal diseases.

3. Comment upon sports (5) from the syllabus

Semester: III

BSZG-2101: CHORDATA EVOLUTION AND TYPE STUDY

1. Origin end evolution of chordates.
2. Bionomics, General characters and classification of the chordates (upto order) of the following groups. Protochordata, Cyclostomata, Pishes, Amphibia, Reptilia, Aves & Mammalia
3. Study of the following Types :

(a) Urochordata - General organization and life cycle of Herdmania

and their affinities

(b) Cephalochordat – Amphiloxus.

(c) Cyclostomata – petromyzon.

(d) Fishes (i) Labeo, scoliodon (ii) Distribution general organization and affinities of Dipnoi; Accessory respiratory organs in fishes.

(e) Amphibia-(i) Origin and evolution of Amphibia; Neoteny.

(f) Reptilia1. Any Lizard

2. Biting and feeding Mechanism in Snakes.

(g) Aves- (i) Columba

(ii) Origin of Birds

(iii) Flight adaptations.

(h) Mammals-(i) Characters and distribution of Protothertria, Metatheria (ii) General organization of primates.

BSBTS -2101: BOTANYIII

Plant Physiology and Environmental Biology

Plant Physiology:

i. Water relation, Absorption of water and Salts
ii. Transpiration.
iii. Mineral nutrition - Role of major and minor element.
iv. Enzymes-Nature, properties & Classification v. Photosynthesis Photophosphorylation calvin cycles and factors affecting Photo-synthesis.
v. Translocation of Organic substances.
vi. Respirtion - Gycolysis, Kreb's Cycle and Factors affecting respiration.
vii. Nitrogen metabolism-Nitrogen fixation and Protein synthesis.

Environmental Biology:

i. Pollution. ii. Soil-Types, water holding capacity, reclamation

HNL – 2101 : HINDI –II

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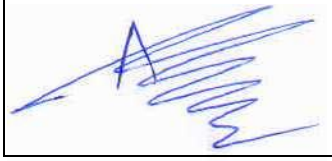

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BSZG-2101P: PRACTICAL: CHORDATA EVOLUTION

A) Taxonomy of Chordata:
1. General characters and classification of Phylum Chordata

2. General characters and Classification up to orders of the following chordates or as per the availability in the laboratory from the major orders, (Specimens or Models): Protochordata:; Herdmania, Doliolum Salpa, Amphioxus. Agnatha: Petromyzon, Myxine. Pisces: Scoliodon, Torpedo, Acipenser, Exocoetus. Hippocampus Amphibia: Ichthyophis, Salamander, Bufo, Hyla. Reptilia: Varanus, Phrynosoma, Chameleon, Cobra, krait, Russell's viper, Typhlops, Hydrophis Aves: Duck, Woodpecker, Kingfisher, Parrot. Mammalia: Mongoose, Squirrel.
Manis. Bat., monkey,

B) Dissections:

1. Dissection - afferent and efferent branchial vessels, cranial nerves, internal ear of scoliodon. 2. Dissection - Digestive system, Arterial system, venous system, reproductive
system of rat.

3. Permanent micro-preparations .a. Fish scales. b. Ampullae of Lorenzini. c. Eyeball muscles. 4. Observations of air bladder in air breathing fishes. C) Osteology. Rabbit, Varanus
(excluding loose bones of skull).

D. Evolution:

1. Study of fossils, including living fossils.

2. Study of Evidences of evolution. 1) Analogous and Homologous organs. ii) Connecting links (Peripatus, Archaeopteryx, Limulus) iii) Embryological evidences

3. Application of Hardyweinberg's law
4. Study of Mesozoic Reptiles (By Models/Charts).

5. Mimicry, coloration in animals.
6. Beak and Leg modifications with reference to: Parrot, Woodpecker,

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Kingfisher, Heron,
Duck, Sparrow/Pigeon, Hawk/Kite, Owl.
E. Histological Slides :Amphloxus, Frog, Rat Slides
Amphioxus : T.S, Oral hood, Pharynx, Tail
Frog :T.S. lung, Stomoch, Kidney, T.S. Intestine,
Rat :T.S. Liver, Pancrease, Ovary, Testies, Pituitary, Thyroid, Adrenal

BSBT-S -2101P: PRACTICAL: BOTANY – III

To comment upon plant Physiology experiment; set up among experiment included m the Syllabus: (a) T/A ratio. (b) Ganong's Photometer-Rate of transpiration. (c) Farmer's Photometer-Rate of transpiration. (d) Unequal transpiration by $CaCl_2$, method. (e) Oxygen evolution during photosynthesis. (f) Rate of Photosynthesis by Wilmott's bubbler (g) Anaerobic respiration.

Semester: IV

BSZG-2201: COMPARATIVE ANATOMY & EMBRYOLOGY EVOLUTION AND TYPE STUDY

Comparative Anatomy:

Study of the following organ systems in the vertebrate groups:

(i) Integument; its derivatives and function
(ii) Gastrointestinal tract
(iii) Respiratory systems
(iv) Heart, Aortic arches
(v) Brain
(vi) Evolution and fate of kidney, urinogential ducts, gonads

(vii) Evolution of chondro-Splanchno & osteocranium

Embryology:

(i) Gametogenesis: Fertilization and Parthenogenesis

(ii) Types of vertebrate eggs cleavages patterns

(iv) Development of Amphioxus (upto the formation of coelom)
(v) Development extra-embryonic membranes in chick

(v) Placenta in mammals it development types and functions

(vi) Organogenesis of Heart, Brain and Eye in chick embryo

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BSBT-S -2201: BOTANY-IV

IMMUNOLOGY

Overview of immune system: Historical perspective of Immunology, Early theories of Immunology, Haematopoiesis, Cells and organs of the immune system.

Innate and Adaptive immunity: Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural immunity, Active: Artificial and natural immunity, Immune dysfunctions.

Antigens: Antigen city and immunogenicity, immunizes, adjuvant and haptens, Factors influencing immunogenicity, B and T cell epitopes.

Immunoglobulin's: Structure and functions of different classes of immunoglobulin's, Antigen antibody interactions' Immunoassays' Polyclonal sera, Monoclonal antibodies, Hybridoma technology
Major Histocompatibility Complex: Structure and functions of endogenous and exogenous pathway of antigen presentation. Cytokines: Properties and functions, Cytokine-based therapies Complement System: Components and pathways of complement activation Hypersensitivity: Gell and Coombs' classification and Brief description of various types of hypersensitivities.

Vaccines: Types of vaccines: Recombinant vaccines and DNA vaccines.

ENL-2201; ENGLISH - Il

Short Stories

1. Maupassant - The Necklace
2. O. Henry - The Last Leaf
3. Catherine Mansfield - A Cup of Tea
4. R.K. Narayan - Selvi
5. MR Anand - The Lost Child

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6. Jhumpa Lahiri - The Interpreter of Maladies

7. Shashi Deshpande - Hear Me Sanjaya!

II. Pieces of Prose

a. James Bryce - Some hints of Public Speaking

b. C.E.M. .Toad - A Dialogue on Civilization

c. Hill - Principles of good writing

d. Bapsi Sidhwa - Why do I write?

e. Jawahar Lal Nehru - The Reawakening of India

f. Subhash Chandra Bose - To Delhi, To Delhi

g. Dr. Rukhmabai - Purdah - The Need for its Abolition

III. Novel

Lord of the Flies - William Golding

BSZG-2201P: PRACTICAL: COMPARATIVE ANATOMY & EMBRYOLOGY EVOLUTION AND TYPE STUDY

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs

2. Disarticulated skeleton of Frog, Varanus, Fowl, Rabbit

3. Carapace and plastron of turtle /tortoise

4. Mammalian skulls: One herbivorous and one carnivorous animal

5. Dissection of rat to study arterial and urinogenital system(subject to permission)

6. Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording (may be included if dissection not permitted)

7. Project on skeletal modifications in vertebrates (may be included if dissection not permitted)

BSBTS -2201P: PRACTICAL: BOTANYIV

1. Demonstration of lymphoid organs
2. Ouchterlony's double immuno-diffusion method
3. ABO blood group determination

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4, Preparation of single cell suspension of splenocytes from chick spleen, cell counting and viability test
5. ELISA/ dot Elisa (using kit)
6. Principles, experimental set up and applications of immune-electrophoresis, RIA, F

Semester: V

BSZG 3101: MAMMALIAN PHYSIOLOGY

Physiology (Mammals): 1. Physiology of digestion, Respiration (Ventilation of lungs and transport of gases),
Excretion & Osmoregulation and circulation
2. Mechanism of thermoregulation.
3. Acid base balance.
4. Physiology of Vision and Hearing.

BSZG 3102: CELL BIOLOGY & BIOMETRY

Cell Biology:
1. Ultrastructure & function of the following cell organelles-Plasma membrane, mitochondria & golgi complex.
2. Ribosome & Protein synthesis.
3. Chromosomes & Giant chromosomes.
4, Active transport across cell membrane.
Biometry:
Scope and application of the following statistical method in Biology.
1. Normal distribution and its attribution range, mode, median and arithmetic mean.
2. Standard error, standard deviation, Simple test and Chi-square test.

BSZG 3103: BIO-CHEMISTRY AND ENDOCRINOLOGY

Biochemistry:
(i) Structure and classification of of Amino Acids, Protein, Carbohydrate & fats.
(ii) Metabolism of Carbohydrate Glycolysis, Glycogenesis and Kreb's cycle.
(iii) Beta-oxidation of fatty acids.
(iv) Vitamins -Definition, Types and functions.
(v) pH, buffers and electrolyte dissociation.
(vi) Enzymes classification and mechanism of action

Endocrinology (Mammal):

1. Histo-physiology of the various endocrine glands.
2. Chemical nature and physiological actions of the hormones secreted by Ai

Neurohypophysis Adrenal, thyroid, Islets of Langerhans and Gonads.

BSEZG 3101 P: PRACTICAL: MAMMALIAN PHYSIOLOGY

1. Enumeration of total RBC.
2. Estimation of baemoglobine (grv/ 100 ml) in blood.
3. Determination of ESR of blood.
4. Determination of bleeding and clotting time.
5. Determination of O2 uptake by Terestrial animal.
6. Simple heart-beat and muscle curve by drum method.
7 Dissection and display of any four the following endocrine glands in a mammal gonad, thyroid, adrenal, Pancreas.
8. Identification and comment upon the histological slides (four in number) of the following: Pituitary, Adrenal, Ovary, Testes, Islets Langerhanns, Thymus, Thyroid, Parathyroid and Vaginal smears.

BSZG 3102 P: PRACTICAL: CELL BIOLOGY & BIOMETRY

I. Vital staining of secretary granules in Salivary glands of Cockroach and Mitochondria in the buccal epithelium.
2.Gram's staining technique for visualization of prokaryotic cells
3.Study various stages of mitosis from permanent slides
4, Study various stages of meiosis from permanent slides.
5. Study the presence of Barr body in human female blood cells/cheek cells. (Preparation of permanent slides)

BSZG 3103 P: PRACTICAL: BIO-CHEMISTRY AND ENDOCRINOLOGY

1. Benedicts test for reducing sugar.
2. Molisch's test.
3. Iodine test for starch and glycogen.
4. Ninhydrin reaction for glycine / tyrosine I tryptophan.
5. million's reaction for glycine / tyrosine / phenylalanine.

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Semester: VI

BSZG 3201: GENETICS AND BIOTECHNOLOGY

Genetics .

(i)Mendelian Inheritance
(ii) Linkage and crossing over.
(iii) Structure and Replication of DNA; transcription, genetic code and translation,
(iv) Chromosomal aberrations the genetic and cytological manifestations and Significance,
(v) Gene mutation and molecular mechanism of its origin.
(vi) Extra-nuclear genetic system.
(vii) Eugenics.
Biotechnology:
Introduction, Concept and Scope of Biotechnology

Techniques in Gene manipulation:

Outline process of genetic engineering and recombinant DNA technology, Isolation of genes, Concept of restriction and modification: Restriction end nucleases, DNA

modifying enzymes. Cloning Vectors: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, HAC. Shuttle and Expression Vectors. Construction of Genomic libraries and cDNA libraries Transformation techniques: microbial, plants and animals: Cloning in mammalian cells, Integration of DNA into mammalian genome Electro oration and Calcium Phosphate Precipitation method. Animal cell Culture: Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines, Culture media Natural and Synthetic, Stem cells, Cryopreservation of cultures. Agarose an Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, DNA sequencing: Sanger method, Polymerase chain reaction, DNA Fingerprinting and DNA
microarrays.

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BSZG 3202: PALEOZOOLOGY, EVOLUTIONARY HISTORY AND ZOOGEOGRAPHY

Evolution:
(i) Sources of hereditary variations and their role in evolution,
(ii) Principles of evolution, Lamarkiam, Neo-Lamarkism, Darwiniam & Neo-Darwininm.
(iii) Isolating mechanisms and their role in evolution.
(iv) Mimicry and colouration.
(v) Fossil hustory of Horse & Man.
(vi) Introduction to population genetics and Hardy-Weinberg Law

Zoogeography and Paleozoology:

(i) Zoogeographical realms of the world, their boundaries and climatic peculiarities.
(ii) Characteristic & Peculiar fauna of Oriental Ethopian and Australian regions.
(iii) Characteristics of Island fauna.
(iv) Theories & Principles pertaining to animal distribution.
(v) Different geological eras of the world, their duration and climatic conditions.
(vi) Faunistic Peculiarities of Paleozoic, Masozoic and Cenozoic eras.
(vii) fossils, their mode of formation & age determination.

BSZG 3203: MECHANISM OF EVOLUTION AND ANIMAL BEHAVIOUR

Introduction to Animal Behaviour

Origin and history of Ethology; Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen, Proximate and ultimate causes of behavior, Methods and recording of a behavior

Patterns of Behavior

Stereotyped Behaviors (Orientation, Reflexes); Individual Behavioral patterns; Instinct vs. Learnt Behavior; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Social and Sexual Behavior

Social Behavior: Concept of Society; Communication and the senses; Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.

Sexual Behavior: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care

GY BSZG 3201 P: PRACTICAL: GENETICS AND BIOTECHNOLO

1. Acetocarmine stained squash preparation of the onion root tips and testes of grasshopper demonstrate stages of mitotic and meiotic divisions respectively.
2. Acetocarmine preparation of the giant chromosomes of the chironomus/drosophila larvae.
3. Genomic DNA isolation from E. coli
4, Plasmid DNA isolation (pUC 18/19) from E. coli
5. Restriction digestion of plasmid DNA.
6 Construction of circular and linear restriction map from the data
7. Calculation of transformation efficiency from the data provided.
8. To study following techniques through photographs
a. Southem Blotting
b, Northern Blotting
c, Western Blotting
d. DNA Sequencing (Sanger's Method)
e. PCR
f DNA fingerprinting

BSZG 3202 P: PRACTICAL: EVOLUTION AND PALEOZOOLOGY

1. Serial homology is exhibited by the appendages of prawn.
2. Homology and Analogy as exhibited by the wings of birds, bat and insect.
3. Adaptive radiation as exhibited by beaks of birds and dentition of mammals.
4. Study of Fossils.
5. Identification and comments upon the specimens/slides on Economic Zoology and Cytology.

BSZG 3203 P: PRACTICAL: ANIMAL BEHAVIOUR

1.To study nests and nesting habits of the birds and social insects.
2, To study the behavioral responses of wood lice to dry and humid conditions.
3. To study geotaxis behavior in earthworm.
4, To study the photo taxis behavior in insect larvae.
5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioral Activities of animals and prepare a short report.
6. Study and act gram constriction of locomotors activity of suitable animals models.

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