



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Course Structure and Syllabus

M.Sc. Zoology

(For Admission Batch 2018-19)

SECOND SEMESTER



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M.Sc. Zoology

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2nd Semester: Course Structure

Sl. No.	Sub Code	Subject	Hrs / Week			Credit	Marks	
			L	T	P		C	CE
Theory								
1	MZY182201	Animal Taxonomy	4	0	0	4	30	70
2	MZY182202	Genetics	4	0	0	4	30	70
3	MZY182203	Immunology	4	0	0	4	30	70
4	MZY182204	Microbiology and Biotechnology	3	0	0	3	30	70
Practical								
1	MZY182213	Lab – I (Immunology)	0	0	4	2	30	70
2	MZY182212	Lab – II (Genetics)	0	0	4	2	30	70
3	MZY182214	Lab – III (Microbiology and Biotechnology)	0	0	4	2	30	70
Total			15	0	12	21	210	490
Total Contact Hours per Week: 27								
Total Credit : 21								

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182201	Animal Taxonomy	4-0-0	4

MODULE 1: Biosystematics

(14 Lectures)

Definition and basic concepts of biosystematics taxonomy and classification.

- Trends in biosystematics: Chemotaxonomy cytotaxonomy and molecular taxonomy
- Dimensions of speciation and taxonomic characters.
- Species concepts: species category, different species concepts, subspecies and other infra-specific categories.
- Theories of biological classification: hierarchy of categories.

MODULE 2: Taxonomic procedures

(14 Lectures)

Taxonomic Characters. Different kinds.

- Origin of reproductive isolation, biological mechanism of genetic incompatibility.
- Taxonomic procedures: Taxonomic collections, preservation, curation, process of identification.
- Taxonomic keys, different types of keys, their merits and demerits.
- International code of Zoological Nomenclature (ICZN): Operative principles, interpretation and application of important rules: Formation of Scientific names of various Taxa.

MODULE 3: Biodiversity

(12 Lectures)

Definition and indices of Biodiversity

- Biodiversity hot spots with ref to NE region
- Biodiversity conservation –methods and strategy formation
- Forest biodiversity for medical use

MODULE 4: Types of Biodiversity

(8 Lectures)

Types of Biodiversity

- Levels of Biodiversity: genetic, species and ecological diversity

Reference/ Text Books:

1. G. G. Simpson. Principle of animal taxonomy; Oxford IBH Publishing Company. 1961(1st edition)
2. V.C Kapoor-Theory and practice of animal taxonomy,6TH EDITION 1983(Reprint 2011)
3. J.C. Avise. Molecular Markers, Natural History and Evolution, Chapman & Hall, New York.
4. E.O. Wilson, Biodiversity, Academic Press, Washington.
5. E. Mayer & P. Ashlock Principles of systemic Taxonomy, (International edition1991)
6. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northem & Co

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182202	Genetics	4-0-0	4

MODULE 1: Mendelism (10 Lectures)

Mendelism: Laws of inheritance, dihybrid cross, concept of allele, genotypic and phenotypic ratios, back cross, test cross. - Multiple alleles. - Linkage and Crossing over - Gene Mapping - Human Sex chromosomes, Barr bodies

MODULE 2: Sex determination (10 Lectures)

Sex determination

- Sex determination in Drosophila and caenorhabditis elegans.
- Sex determination in Human: Role of Y Chromosome in sex determination.
- Dosage compensation in Human, Drosophila and caenorhabditis elegans.
- Classification and nomenclature of human chromosomes
- Human genome project (HGP)

MODULE 3: Genetic Diseases (10 Lectures)

- General idea of human Genetic Diseases Monogenic Human Genetic Diseases – Chronic myeloid leukemia
- Chromosomal human Genetic Diseases – Cystic fibrosis, Thalassemia, Down’s syndrome
- Human gene therapy - Prenatal diagnosis & genetic counseling
- Genetic screening.

MODULE 4: Genetic engineering (8 Lectures)

Applications of genetic engineering - Molecular diagnosis of genetic disorders and gene therapy, Crop and livestock improvement

MODULE 5: Genomics (10 Lectures)

- Structural Genomics – Study of structure of genome (cytological and genetic mapping of chromosomes, RFLP mapping, Contig mapping, STS mapping)
- Gene libraries
- Transgenic animals & Knockout animals their applications

Reference/ Text Books:

1. Snustad and Simmons-Principles of Genetics, John Wiley & Sons, USA (4th Ed. 2005)
2. Griffiths, J.F., Gelbart, M., Lewontin, C. and Miller-Modern Genetic Analysis: Integrating Genes and Genomes, W. H. Freeman and Company, New York, USA

3. J. Russell-Genetics, Benjamin-Cummings Publishing Company, San Francisco, California, USA
4. Genes IX, 9th edition (2008), Benjamin Lewin. Publisher - Jones and Barlett Publishers Inc.
5. L.C. dunn, principals of Genetics
6. A.M. Winchester genetics
7. Edgar Alterbrg Genetics

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182203	Immunology	4-0-0	4

MODULE 1: Immunity (12 Lectures)

- Cells and tissues of the immune system
- Maturation of B and T lymphocytes

MODULE 2: Humoral and cell mediated immunity (10 Lectures)

- Humoral immunity: Antigen and haptens humoral immune response
- Cell mediated immunity
- T cell receptors, MHC complex, Antigen: Processing and Presentation - T- Helper cell and Lymphocyte activation. Role of Cytotoxic T cells

MODULE 3: Cellular activities and immune mediation (8 Lectures)

- Antigen-Antibody Interactions – Immuno Assays
Monoclonal and polyclonal antibody
- Hybridoma technology for production of monoclonal antibody
- Clinical application of monoclonal antibody complement system.
- Cell-Mediated Reactions

MODULE 4: Immune system and infectious disease (10 Lectures)

Immune response to infectious diseases- Immunology of HIV Infection

MODULE 5: Immunopathology (8 Lectures)

- Immune Regulation & Tolerance
- Autoimmunity
- Transplantation immunology
- Immunoprophylaxis (Vaccines)
- Disorders of the Immune Response Immunology of Cancer
- Modern Antibody Therapy

Reference/ Text Books:

1. The elements of Immunology- F. H. Khan (Pearson)
2. Immunology – G. Pinchuk (Tata Ma Graw-Hill Edition)
3. Immunology- J. Kuby
4. Immunology-A. K. Chakraborty
5. Principles of Cellular and Molecular immunology – J, M. Austyn et al.

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182204	Microbiology and Biotechnology	3-0-0	3

MODULE 1: Microbial Biotechnology (12 Lectures)

Introduction, System of classification; overview of application of microbiology in different fields; prokaryotes, eukaryotes, Achaea and protozoa; structure of microbial cell, spore, cell wall flagella, capsule, Microbial growth and nutrition; theory and practice of sterilization, culture media, preservation and maintenance of culture.

Microbiology and public health, Viruses: general characteristics and classification; general account of Bacteriophage, replication, DNA and RNA viruses with special emphasis on HIV and HBV; Antivirus; List of common bacterial fungal and viral diseases of human beings (name of the diseases, causative pathogen, part affected)

MODULE 2: Immunology (10 Lectures)

Immunological disorders and autoimmune diseases, Immune response to viral and bacterial lymphatic infection, Immune response in cancer; Advanced immunological techniques RIA, ELISA, Western blotting, immunofluorescence.

MODULE 3: Biodiversity, IPR and Biosafety (10 Lectures)

Definition and geographical causes for diversity; Maintenance of ecological biodiversity; Threats to biodiversity, conservation of biodiversity.

Types of IP: Patents, Trademarks, copyright, Plant Variety Protection(PVP), Protection of New GMOs. Choice of IPR protection, Benefits from IPR, Problems from IPR

Definition of Biosafety; Objectives of Biosafety, Introduction to biological safety cabinets, Biosafety for human health and environment, Social and ethical issues.

MODULE 4: Seri-Biotechnology: (4 Lectures)

Introduction, application of biotechnological tools for increasing Silk production. Improvement of host plants and Silk quality, overcome Silkworm diseases.

Reference / Text Books:

1. Fundamentals of Microbiology by R.N. Bhattacharyya published by: Kalyani Publication
2. Experimental Microbiology by R.N. Bhattacharyya published by: Kalyani Publication
3. Microbiology by – Prescott, Mac Graw Hill
4. Language of Biotechnology by – Ashutosh Debata, Panda & Debata Published by: New Central Book Agency (P) Ltd.
5. Biotechnology by B.D. Singh Published by: Kalyani Publishers
6. A Text Book of Biotechnology by R.C. Dubey Published by: S. Chand & Company Ltd.

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182213	Lab – I (Immunology)	0-0-4	2

Sl.No.	Experiments	Hours
1.	Study of blood groups in human: Antigen, antibody interaction	4
2.	Collection of plasma and serum	6
3.	Study of different types of blood cells	4
4.	Preparation of histological slides of the primary and secondary lymphoid organs.	4 6
5.	Study of permanent slides of thymus, spleen lymph node, tonsil and Payer patch in intestine.	2
	Viva-Voce	2
	Total	24

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182212	Lab – II (Genetics)	0-0-4	2

Sl.No.	Experiments	Hours
1.	Preparation of metaphase chromosome of Mouse/Rat bone marrow, C and G banding of chromosome	6
2.	Study of polytene chromosome	4
3.	Study of sex chromatin in buccal smear	4
4.	Study of Hardy Weinberg equilibrium in human population by taking the example of blood group system (ABO).	4
5.	Practical notebook Viva-Voce	6
	Total	24

Course Code	Course Title	Hours per week L-T-P	Credit C
MZY182214	Lab – III (Microbiology and Biotechnology)	0-0-4	2

Sl.No.	Experiments	Hours
1.	Cleanliness, media preparation, sterilization, culturing methods.	6
2.	Staining techniques in microbiology: simple staining, negative staining, positive staining	4
3.	Determination of Rh factor in humans.	4
4.	Assay of antibiotics and demonstration of antibiotic resistance.	4
5.	Preparation of antigen.	6
6.	Field study: Visit to Sericulture Farm, and preparation of field report. Practical notebook Viva-Voce	
	Total	24
