FMRT 4th Semester Syllabus

1. Introduction to Genetics and Molecular Biology

Introduction: Historical background, different branches and their importance, scope and development, some basic terms and symbols.

Mendelian genetics: Mendel's laws and modification of Mendelian inheritance, dominance interaction of gene.

Chromosome and Gene: Gene and gene concept, genotype and phenotype of organisms, evidence to indicate genes are located on the chromosome.

Linkage and recombination: Discovery of linkage, linkage maps, detection of linkage, genetic interference coincidence and crossing-over, mutation and chromosomal aberrations, epistasis.

Allele: Definition, characteristics, example and importance of multiple alleles and pseudo alleles.

Inheritance: Quantitative inheritance, cytoplasmic inheritance, inheritance of extra-nuclear genes, maternal inheritance, Sex determination, mechanism of sex determination, Balance theory of sex determination and sex-linked, sex-limited and sex-influenced inheritance.

Nucleic acids: Occurrence, isolation, purification and molecular weight determination, Chemical composition, structure and characteristics of DNA, Chemical, enzymatic and PCR methods of DNA sequencing: Recombinant DNA General features and mechanism of DNA replication, Watson-Crick model, hereditary nature of DNA, DNA repair mechanism, Structures of RNA and their sequences.

Transcription: Prokaryotic and eukaryotic transcription, RNA polymerase, mechanism of RNA splicing and processing, mRNA structure.

Translation: Genetic code, specificity, collinearity of gene and protein structure, post-translational modifications.

Protein synthesis: Structure, type and function of the eukaryotic ribosome, location and functional site of the ribosome, Protein synthesis mechanism- isolation, elongation and termination, Control of translation in both prokaryotes and eukaryotes.

2. WETLAND AND LAKE MANAGEMENT

1 Definition, Types & Characteristics:

1.1 Definition and Classification of Lakes and Wetlands

1.2 Origin and Morphology of Lakes and Wetlands

1.3 Characteristics of Wetland

1.4 Importance of Wetlands

2 Distribution of Lakes and Wetlands:

2.1 Geographic Distribution of Major Lakes and Wetlands Systems

2.2Distribution of Wetlands in Bangladesh

3 Dynamics & Ecological Aspects of Tropical Wetlands:

3.1Ecological Characteristics of Freshwater and Coastal Wetlands

3.2Pedological, Hydrological and Biological Elements and Processes, and their interactions

4 Bio-Diversity of Freshwater and Coastal Wetlands:

4.1Floral Diversity

4.2Faunal Diversity

5 Wetlands and Fisheries:

5.1Fisheries Significance of Inland and Coastal Wetlands

5.2Production Enhancement of Artificial Lakes: Open-water Stocking in Lakes and Reservoirs

6 Issues of Wetland Management in Bangladesh:

6.1Inventory of Resources, Assessment, Problems & Management Measures

6.2Socio-economic issues in wetland management

6.3Wetland policies, rules and regulations in Bangladesh

6.4Institutional aspects of wetland management in Bangladesh

6.5Threats to Wetland Ecosystems

6.6Conservation of Wetlands in Bangladesh

7 Conventions and Laws on Wetlands:

7.1Laws on Wetlands in Bangladesh

7.2Wetland Management and International Perspective

7.3RAMSAR Convention, 1971 on Wetland Management

2.1 WETLAND AND LAKE MANAGEMENT PRACTICAL

1 Mapping of Major Wetlands in Bangladesh

2 Zonation of Wetland Systems and Lakes

3 Inventory of Flora and Fauna and their Reporting

4 Identification of Flora and Fauna

5 Preparation of Suitable Management Models of Wetlands and Lakes in Bangladesh

3. COASTAL AND MARINE AQUACULTURE

1) 1 Introduction: objectives, history, present status, role and scope of coastal aquaculture in Bangladesh.

1.2 Types of aquaculture systems, and levels of aquaculture industries.

2) Site selection: Selection of site for different types of aquaculture basic criteria for a suitable site. Design and construction of culture facilities inshore areas, and sea farming zones.

3) Species selection: Basic criteria for suitable species, genetic selection of cultivable species, commonly cultivable species of fishes, crustaceans, molluscs and seaweeds, indigenous and exotic species, biological features of commonly cultured crustaceans and mollusks.

4) Seed production: Wild seed collection, sorting, preservation and transportation of natural seed, larval rearing of marine finfishes, prawns and other marine organisms.

5) Farming techniques: Farming techniques in various zones of sea, pen culture, cage culture, raft culture etc.

6) Culture techniques of marine fishes, shrimp, crabs, mussels, clams, oysters, abalone, scallops, squid, green turtle and seaweed. Pearl culture life cycle of pearl oyster, techniques of pearl culture.

7) Preparation and management of sea farm: Control of predators, aquatic vegetation, and weed fishes, biofouling, fertilization, and harvesting.

8) Mangrove fisheries: mangrove ecosystem, energy flow in mangrove swamp, the prospect of fisheries and fish culture in mangrove areas.

3.1 COASTAL AND MARINE AQUACULTURE PRACTICAL

1 Designing of a coastal shrimp and fish farm.

2 Transportation of larvae and PL of shrimp.

3 Nursing of brackish water fish and shrimp fry.

4 Decapsulation and hatching of Artemia in laboratory condition.

5 Case study: Visit a shrimp hatchery and a coastal aquaculture farm and report writing.

4. INTRODUCTION TO SOCIOLOGY

1. Introduction to Sociology: Meaning, Nature, Scope, Importance, Subject matters, Factors contributing to the emergence of sociology

2. Society: Meaning, Characteristics, Typology/classification

3. Community: Meaning, Elements/Community vs Society...

4. Association and Institution: Meaning, Characteristics and Community vs Society....

5. Family: What, Family as a system, Types and Characteristics, Global trends in family composition, future of family, functions of family, Debate on Nuclear vs. Joint Family

6. Marriage: Meaning and definitions, Characteristics, Types, Legal matter, Functions/role, Trends and Comparative discussion between Hindu Marriage vs Muslim Marriage

7. Religion: Definitions, Characteristics, Elements, Functions or roles, Theories of origin of religion and Debate science and religion

8. Culture: Definitions, Characteristics, Types (Material and non-material), and Elements of Culture.

9. Socialization: Definitions, Importance of socialization, Stages of socialization, Agents of socialization and Role of culture in socialization

10. Social Control: Definitions, Nature, Purposes, Types, Agencies/Methods/Mechanisms

11. Social Stratification: Definitions, Forms, Determinants/Dimensions, and Two Theories

12. Social Change: Definitions, Characteristics/Features, Factors affecting Social Change and Two Theories

13. Drugs Abuse/Addiction: Meaning, Different drugs, How drug addiction Begins? Signs of Drug use and addiction, Side effects/Negative Effects of Drug Addiction

14. Crime and Deviance: Meanings, Differences between crime and deviance, Types of crime, Root Causes, and Prevention

15. Slums: Definition, Characteristics/Indicators, Global trend of the slum, Causes of the slum, Measures to be undertaken.

5. GIS

7. Introduction to GIS

7.1 General Introduction and Definitions
7.2 GIS requirements (hardware, software, manpower)7.3 GIS and related technologies (Remote Sensing, GPS, Computerized Cartography, photogrammetry)
7.4 Applications of GIS
7.5 Future directions of GIS (WebGIS, OpenGIS)
7.6 GIS theories

8. Mapping and scales

8.1 Types of Maps
8.2 Map scale
8.3 Coordinates and projection systems

9. GIS data structure

9.1 Characteristics and sources of GIS data9.2 Raster and vector data model: basic understanding
9.3 Understanding layers and attribute

10 Images and rasters/grids

10.1 Understanding rasters: raster properties pixels, resolution, color depth,storage requirement and compression, histogram; advantages and disadvantagesGIS specific raster/grid manipulation: buffering, recalculation,
10.2reclassification, thinning, attribute manipulation, 3D modeling & analyses10.3 Fundamentals of RS specific image manipulation

11 Vectors

11.1 Understanding vectors: topologies point, line, polygon; storage requirement; advantages and disadvantages
11.2 Vector manipulation: overlay, buffer, geometric modeling

12 Attributes and database

12.1 Built attributes, raster and vector case, manipulating attributes12.2 External data sources, manipulating external database, inking with GIS