SYLLABUS
For The
B.Sc in Zoology (Hons)

The following syllabus* (Part II) *has been finalised by the UG-BOS in Zoology of W.B.S.U for being implemented from the year 2011

PART II - 300 Marks

Paper-IV (Theory) : Genetics, Cell and Molecular Biology, Biochemistry and Biophysics (100)

Group A (50) : Genetics, Cell Biology and Molecular Biology

Module 401: Genetics (20)

1. Significance of Mendel's experiments and laws, Concepts and examples of -Test Cross and Back Cross, Incomplete Dominance/Codominance, Multiple Alleles, Epistasis, Polygenic inheritance
2. Chromosomal aberrations, gene mutations and human diseases (Down's, Klienfelter's, Turner's, Cri du Chat, Sickle cell, Haemophilia, Thallassimia, Albinism – only genetical aspects here, details of physiological consequences not required), Sex chromosomes and sex-linked inheritance
3. Linkage and Recombination – Types and outcome, linkage disequilibrium, 3-point cross

Module 402: Cell Biology and Molecular Biology (30)

1. Units of biological measurements and microscopy
2. Plasma membrane : lipid bilayer, membrane proteins and membrane transport - brief outline only
3. Other organelles : introduction to structure and functions of mitochondria, GERL
4. Cell Cycle : preliminary concept
5. Replication : only outline of the mechanisms
6. Transcription : only outline of the mechanisms
7. Translation : only outline of the mechanisms
8. Gene expression-lac operon, trp operon (only introductory outline of the processes)
9. Types of mutations
10. Transposable genetic elements (preliminary introductions)
11. Genetic engineering- preliminary concepts and common examples
12. Introductory principles of common methods used in cellular and molecular biology: PCR, RFLP, DNA fingerprinting, Gene sequencing

Group B : Biochemistry and Biophysics (50)

Module 403: Biochemistry (30)

1. Chemical evolution of biomolecules (outline only)
2. Biological significance of water
3. Structural identities of biomolecules : Carbohydrates, Amino Acids, Peptides, Lipids (preliminary outlines of lipids), nucleic acids
4. Enzymes (major classes of enzymes –mode of actions and examples) and enzyme kinetics
5. Metabolic pathways: Glycolysis, HMP shunt, Kreb's cycle, electron transfer system (outline), Gluconeogenesis, Glycolysis, beta oxidation,

Module 404 : Biophysics (20)

1. Three-dimensional structure of proteins (preliminary concepts only) : peptide bonds, alpha helix, beta conformation, common examples of globular proteins
2. Structure of nucleic acids (preliminary concepts only) : DNA and RNAs
3. Chromosome structure including Nucleosomes (preliminary concepts only)
4. Introductory principles of common methods used in biochemistry and biophysics : Chromatography, Ultracentrifuge, Electrophoresis, X-ray crystallography, Immunoeletrophoresis & Western blotting

Paper V (Theory): Taxonomy, Ecology, Biodiversity & Microbiology, Parasitology, Immunology (100)

Group A (50): Taxonomy and Systematics, Ecology and Biodiversity

Module 501: Taxonomy and Systematics (10)

1. Modern definitions of taxonomy and systematics, philosophy and working of modern taxonomy, Linaean hierarchy,
2. Concept of a species in taxonomic practice
3. ICZN and its important rules,
4. Cladistics: simple introductory concept and examples.

Module 502: Ecology (25)

1. Ecology of populations: survivorship curves, life history tables, age-sex

pyramids, population growth models (exponential and logistic models only)
2. Ecology of communities : defining a community, measuring species diversity, species interactions (competition and coexistence, predation, herbivory, mutualism), succession and concept of climaxes, Theory of Island Biogeography (introductory concepts only)
3. Ecosystems ecology: trophic structure, energy flow, nutrient cycling

Module 503 : Biodiversity and Wildlife Conservation (15)

1. Biodiversity: concept of biodiversity, Importance of biodiversity, biodiversity hotspots, India- a megadiversity country, CBD, Indian Biodiversity Act.
2. Wildlife Conservation: Major forest types and their locations in India, Major wildlife of India - their Indian distribution, present status, conservation efforts (PAs- major sanctuaries and national parks, Indian Wildlife Act, IUCN categories, Project tiger as a case study)

Group B (50): Microbiology, Parasitology, Immunology

Module 504: Microbiology (15)

1. The study of microbial structure
2. Microbial Nutrition
3. Microbial growth
4. Control of Microorganisms by Physical and Chemical agents
5. Pathogenicity of Microorganisms
6. Human diseases caused by Virus (polio, avine influenza) Bacteria (cholera, tuberculosis), Fungi (ringworm)

Module 505: Parasitology (15)

1. Concept of parasitism
2. Origin and evolution of parasitism, host parasitic interactions,
3. Parasitic adaptation: physiological, bio-chemical, Zoonosis, Myasis
4. Identifying characters, life cycles, mode of infections of important parasites – *Entamoeba*, *Giardia, Fasciola, Taenia, Ascaris*

Module 506: Immunology (20)

1. What is Immunology: a short preview of the development of the subject
2. Innate (Nonspecific) and Acquired (Specific) immunity.
3. Central dogma of Immune system: (a) Cells of Immune system (b) Organs of Immune system- Primary & Secondary lymphoid organs.

4. Concept of Antigen & Antigen Presentation: Antigenic determinant (for ABO and Rh group only)
5. The Major Histocompatibility Complex : Antigen processing & presentation
6. Concept of T Cell-Antigen recognition and activation [Intracellular signal transuding enzymes excluded] : Structure and function of TCR complex, APC-T Cell interaction,
7. Concept of B Cell Activation and Antibody production [Intracellular signal transuding enzymes excluded]: Structure & Function of Immunoglobins [class switching among Immunoglobin gene excluded].Antigenic determinants of Immunoglobins (Isotype, Allotype & Idiotype).
8. Cytokines (source & function of IL-1, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12, Interferons, Tumor Necrosis Factors, Tumor Growth Factors, GM-CSF, M-CSF).
9. The Complement System (Basic concepts & Types only)
10. Techniques in Immunology: ELISA, RIA, Immunodiffusion Techniques,

Paper VI: Practicals (100)

Group A : 50

1. Pedigree analyses (8) : simple pedigrees of Mendelian and common sex-linked traits
2. Statistical tests of data and decision making (8) : Chi square test for goodness of fit and student t test for comparing means of two small samples from normal populations (paired/unpaired)
3. Database preparation, analyses and graphical presentation by EXCEL in Microsoft/Open Office (7)
4. Ecological study (12) – Sampling techniques in field ecology- Quadrat, Transects, Pitfall, Measuring species diversity of given sample of a community
5. Documentation of local fauna (5): documentation of different species of wild birds, mammals, butterflies, mollusks, fishes, amphibians, reptiles, any other common group of animals (any one group to be chosen by the college for a year and not to be repeated in succeeding year) found naturally in the localities around the college.
6. Viva voce (5)
7. Lab Note book (5)

Group B : 50

1. Uses of microscope, stages and occular micrometer and camera lucida for cellular study (5)
2. Chromosome preparations : Onion root tip (mitotic stages), Grasshopper testes (meiotic stages) and Drosophila larvae (Polytene chromosome and imaginal disc) (15)
3. Biochemical tests (20)- Qualitative tests for unknown carbohydrates and proteins, colorimetric assay of protein (Lowry's method) and glucose (

Nelson and Somogyi method), Preparation of Buffers – PBS, TRIS-Cl,
4. Viva voce (5)
5. Lab Note book (5)

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Text books and references will be prescribed along with the detailed curriculum, soon to be available in this website

Module 401: **Genetics**
Text Book :
Principle of Genetics by Robert H. Tamarin
TMH, 2002
Or
Principles of Genetics by Gardner et al.
8th Ed. Wiley Paper back
References :
Genetics : Analysis of Genes and Genomes by Hartl and Jones; 6th ed., Jones and Bartlett publishers, 2005
Genetics by Strickberger

Module 402: **Cell and Molecular Biology**
Text Book :
Chapters on Cellular structures and Molecular Biology in Integrated Principles of Zoology by Hickman, Roberts and Larson; McGrew Hill
or
Principle of Genetics by Robert H. Tamarin
TMH, 2002
Or
Principles of Genetics by Gardener et al.
8th Ed., Wiley Paperback
References :
Molecular Biology of the Cell by Alberts et al.
Molecular Biology of the gene by Watson et al.
Lehninger Principles of Biochemistry by Nelson and Cox

Module 403: **Biochemistry**
Text Book :
Chapters on Biomolecules and biochemical processes in Integrated Principles of Zoology by Hickman, Roberts and Larson; McGrew Hill
or
Lehninger Principles of Biochemistry by Nelson and Cox
Or
Biochemistry by Stryer
References :
Harper's Illustrated Biochemistry, 28th ed.

Module 404: **Biophysics**
Text Book :
Lehninger Principles of Biochemistry by Nelson and Cox
Or
Biochemistry by Stryer
References :
Standard Internet Sources

Module 501: **Taxonomy and Systematics**
Text Book :
Taxonomy and Systematics by Mayr and Ashlock
References :
Standard internet sources

Module 502: **Ecology**
Text Book :
Ecology : Theory and applications by Peter Stiling, PHI-EEE, 4th edition
References :
Ecology: principles and applications by Chapman and Reiss, Cambridge Low Priced ed.,
Ecology by Charles Krebs

Module 503: **Biodiversity and Wildlife Conservation**
Text Book/ source :
Webpages for Biodiversity, Indian Forests and Wildlife at en.wikipedia.org/wiki
Biodiversity Profile of India in Madhav Gadgil's Home page at ces.iisc.ernet.in/hpg/cesmg/indiabio.html
Biodiversity and Species category Homepages at www.iucn.org

Module 504: **Microbiology**
Text Book :
Microbiology by Prescott, Harley & Klein, 5th Edition; 2002
Or
Microbiology by Pelczar et al. Mc Grew Hill, 5th Ed.
References :
Standard internet sources

Module 505: **Parasitology**
Text Book :
Outlines & Highlights For Human Parasitology By Roberts and Janovy, Academic Internet Publishers, 6th Ed.
Or
Parasitology by Bogitsh, Carter and Alteman, Academic Press, Indian Edition, 2006

References :
Outlines & Highlights For Human Parasitology By Bogitsh**,** Academic Internet Publishers

Module 506: **Immunology**
Text Book :
NMS-Immunology by R. Hyde, Williams and Wilkins
Or
Basic Immunology : Functions and disorders by Abbas and Litchman, W. B. Sanders & Co.
References :
Kuby's Immunology by Goldsby, Kindt and Osborn, W.H. Freeman

Background reading: Students are advised to read thoroughly the following text book before reading topics in the text books specified above to develop their fundamental understanding of the subjects.

Integrated Principles of Zoology by Hickman et al., McGrewHill 11th ed. or later editions. (Free downloadable soft copies of the book is also available through internet)

Students are also to be encouraged to use free internet sources including free downloadable softcopies of books on relevant subjects

For achieving good results, students are advised to study prescribed text books and other reading materials thoroughly and thoughtfully instead of mugging readymade notes.

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Question patterns :

Questions of 1, 3 and 5 marks totalling the assigned marks for the module from each module in all paper.

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Please note that the marks and paper distribution for three years / parts of B.Sc. in Zoology (Hons) would be following. The syllabus and marks distribution for Part I remain as it is now ongoing (implemented for the first year of 2010-2011). *Any previously prescribed pattern of syllabus and marks distribution for the Part II and Part III for B.Sc. in Zoology (Hons) is to be ignored*.

PART-II : 300 Marks

Paper-04 (Theory): 100 marks

Group A: Genetic & Cell and Molecular Biology
Module 401: Genetics (20)
Module 402: Cell and Molecular Biology (30)

Group B: Biochemistry and Biophysics
Module 403: Biochemistry (30)
Module 404: Biophysics (20)

Paper 05 (Theory) : 100 marks

Group A : Taxonomy and Systematics, Ecology, Biodiversity and Wildlife Conservation (50)
Module 501: Taxonomy and Systematics (10)
Module 502: Ecology (25)
Module 503: Biodiversity and Wildlife Conservation (15)

Group B : Microbiology, Parasitogy and Immunology (50)
Module 504: Microbiology (15)
Module 505: Parasitology (15)
Module 506: Immunology (20)

Paper 06 (Practicals): 100 marks

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PART-III : 300 Marks

Paper-07 (Theory) : 100 marks

Module 701: Animal Physiology (40)

Module 702: Histology and Histopathology (20)
Module 702: Endocrinology and Reproductive Biology (40)

Paper-08 (Theory) : 100 marks

Module 801: Developmental Biology (35)
Module 803: Environmental Biology and Toxicology (20)
Module 804: Medical Zoology (10)
Module 805: Economic and Applied Zoology (35)

Paper 09: Practicals (100)

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