VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF ZOOLOGY
M.Sc. DEGREE COURSE IN ZOOLOGY
CHOICE BASED CREDIT SYSTEM
Rules and Regulations, Course Scheme and Scheme of Examination governing the M.Sc. Degree Course in ZOOLOGY
(For those admitted in June 2014 and later)

I. OBJECTIVES OF THE COURSE:

The objectives of the M.Sc. Degree Course in Zoology are

- To meet the academic to applied aspects in zoology suited to real problems of regional and National needs
- To expose learners to frontier and thrust areas of Biology(Zoology)
- To train learners for better performance in various competitive examination and in research careers.
- To enable the learners to acquire and develop self- study habits and
- To shape the learners to become worthy citizens of the Nation in the field of Zoology and interrelated fields.

II. ELIGIBILITY FOR ADMISSION

Applications seeking admission into the M.Sc. Degree Course in Zoology should have a Bachelor's Degree in Zoology / Advanced Zoology/ Animal Sciences of the Periyar University or any of the above degree of any other university accepted by the Syndicate of the Periyar University as equivalent thereto, subject to such condition as may be prescribed therefore shall be permitted to appear and qualify for the M.Sc degree examination after a course of study of two academic years. They should have secured a minimum of 50% of marks in Part III of the degree course. In the case of SC/ST students, the required minimum marks for admission in part – III will be 45%.

III. DURATION OF THE COURSE

The course for the degree of Master of Science in Zoology shall consist of two academic years divided into four semesters. Each semester consists of 90 working days.

IV. REGISTRATION UNDER CBCS

At the beginning of each semester, the students will be enlightened with the elective papers offered in the respective odd / even semester. The students should register their options with the parent department in writing about the choice of elective papers for that semester. The selected elective papers should be such that the paper has not been already studied either as a full paper or a part thereof and such paper should not place as core paper in their major department. The department offering a particular elective paper, will select and finalize the list of students to be admitted to that elective paper. The Principal has the discretion to fix the minimum strength for each elective paper in consultation with the Head of the department concerned.

V. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously and the Internal Assessment Marks for theory will be as under:

1. Average of two Tests - 10 Marks
2. Seminar - 5 Marks
3. Assignment - 5 Marks
4. Attendance - 5 Marks

Total = 25 Marks

Internal Assessment Marks for practical will be as under:

1. Attendance - 10 Marks
2. Observation Note - 10 Marks
3. Model Exam - 20 Marks

Total = 40 Marks

Attendance Breakup

THEORY:

Range	Marks
76-80	1
81-85	2
86-90	3
91-95	4
96-100	5

PRACTICALS:

Range	Marks
76-80	2
81-85	4
86-90	6
91-95	8
96-100	10

VI. DISTRIBUTION OF MARKS

THEORY:

Internal Assessment - 25 marks
External Examination - 75 marks
PRACTICALS:
Internal Assessment - 40 marks
External Examination - 60 marks

VII. ATTENDANCE

Each student must put in a minimum attendance of 75% of the working days of the college in each semester so as to become eligible to appear for the Terminal Examinations. Shortage of attendance in regular classes on the part of any student, not exceeding 10% below the prescribed minimum of 75% may be condoned on medical grounds. Such condonation shall be granted by the Principal on merits. The application for condonation shall be accompanied by a condonation fee, prescribed by the Principal. If a student earns less than 75% attendance in the regular classes in a particular semester and is either ineligible for condonation of shortage of attendance or is not granted condonation, then the student will not be permitted to appear for the Terminal Examinations and the students will have to repeat that semester.

VIII. PASSING MINIMUM

For a pass in each paper, a candidate should secure a minimum of 50% marks in the Terminal Examinations and a minimum of 50% marks in aggregate (i.e., internal and external marks put together).

In the Project and *viva voce*, a candidate should secure a minimum of 50% marks in Project and *viva voce* separately and an aggregate of 50% marks in Project and *viva voce* put together, to get a pass.

IX. ELIGIBILITY CONDITION FOR GETTING THE DEGREE

A candidate undergoing M.Sc., degree course in Zoology will be eligible for the award of M.Sc., degree in Zoology, if he/she completes the entire course and earns a total of 90 credits, (comprising 70 Hard core and 20 Elective credits).

X. CLASSIFICATION OF CANDIDATES

The successful candidates will be classified as per the details given in the following table:

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	**9.0-10.0**	**O**	**OUTSTANDING**
80-89	**8.0-8.9**	**D+**	**EXCELLENT**
75-79	**7.5-7.9**	**D**	**DISTINCTION**
70-74	**7.0-7.4**	**A+**	**VERY GOOD**

60-69	**6.0-6.9**	**A**	**GOOD**
50-59	**5.0-5.9**	**B**	**AVERAGE**
00-49	**0.0-4.9**	**U**	**RE-APPEAR**
ABSENT	**0.0**	**AAA**	**ABSENT**

CLASSIFICATION:

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5-10.0	**O+**	**First Class- Exemplary**
9.0 and above but below 9.5	**O**	
8.5 and above but below 9.0	**D++**	**First Class- Distinction**
8.0 and above but below 8.5	**D+**	
7.5 and above but below 8.0	**D**	
7.0 and above but below 7.5	**A++**	**First Class**
6.5 and above but below 7.0	**A+**	
6.0 and above but below 6.5	**A**	
5.5 and above but below 6.0	**B+**	**Second Class**
5.0 and above but below 5.5	**B**	
0.0 and above but below 5.0	**U**	**Re-appear**

C_i = Credits earned for course in any semester

G_i = Grade Point obtained for course in any semester

n refers to the semester in which such course were credited

For a Semester:

GRADE POINT AVERAGE [GPA] = $\Sigma C_i G_i / \Sigma C_i$

Sum of the multiplication of grade points by the credits of the course

GPA = ----------

Sum of the credits of the courses in a semester

For the entire programme:

CUMULATIVE GRADE POINT AVERAGE (CGPA) = $\Sigma_n \Sigma_i C_{ni} G_{ni} / \Sigma_n \Sigma_i C_{ni}$

Sum of the multiplication of grade points by the credits of the entire programme

CGPA = ----------

Sum of the credits of the courses of the entire programme

XI. OTHER PROVISIONS

Students failing in any paper in any semester must reappear for the examination in that paper and it is necessary to repeat the course. A student who has already passed a paper will not be permitted to reappear for the purpose of improvement.

A student who fails to attend the examination can reappear in the subsequent Terminal Examinations. However, a student who cannot appear for the examination due to lack of attendance, can appear for the examination only after earning the required minimum attendance.

Repeat Examinations will be conducted for the final semester paper(s) within a month after the publication of final semester results. Hence, a student who fails in the final semester examinations can appear for the above paper only in the Repeat Examinations or in the subsequent year Even Semester Examination.

XII. TRANSITORY PROVISION:

Candidates who were admitted to the PG course of study before 2011-2012 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April/May 2014. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

LIST OF ELECTIVE COURSES:

1. Economic Zoology
2. Medical Laboratory Techniques
3. Fishery Biology and Aquaculture
4. First Aid and Home Nursing
5. Radiation Biology
6. Health Education

LIST OF EXTRA DISCIPLINARY COURSES:

1. Sericulture
2. Eco-Toxicology
3. Cancer Biology

COURSE SCHEME AND SCHEME OF EXAMINATIONS
M.Sc. DEGREE COURSE IN ZOOLOGY
CHOICE BASED CREDIT SYSTEM
(For those admitted in June 2014 and later)

Sem	Subject Code	Core/ Elective	Title of the paper	HRS/ Week	Credit	Exam (Hours)	Int. Mark	Ext. Mark	Mark
I	14P1ZO01	Core-I	Biochemistry and Biophysics	5	4	3	25	75	100
	14P1ZO02	Core-II	Cell and Molecular Biology	5	4	3	25	75	100
	14P1ZO03	Core-III	Microbiology	5	4	3	25	75	100
	14P1ZO04	Core -IV	Immunology	5	4	3	25	75	100
	14P1ZOP01	Core Practical	Practical-I	5	4	4	40	60	100
	14P1ZOE01	Elective- I	Economic Zoology	5	4	3	25	75	100
Total				**30**	**24**		**165**	**435**	**600**
II	14P2ZO05	Core-V	Developmental Biology	5	4	3	25	75	100
	14P2ZO06	Core-VI	Animal Physiology	5	4	3	25	75	100
	14P2ZO07	Core-VII	Advanced Genetics	5	4	3	25	75	100
	14P2ZOP02	Core Practical	Practical-II	5	4	4	40	60	100
	14P2ZOE02	Elective- II	Medical Laboratory Techniques	5	4	3	25	75	100
	14P2ZOE03	Elective- III	Fishery Biology	5	4	3	25	75	100
			Total	**30**	**24**		**165**	**435**	**600**
III	14P3ZO08	Core- VIII	Animal Biotechnology	6	5	3	25	75	100
	14P3ZO09	Core- IX	General and Applied Entomology	6	5	3	25	75	100
	14P3ZO10	Core- X	Environmental Biology	6	5	3	25	75	100
	14P3ZOP03	Core Practical	Practical - III	6	4	4	40	60	100
	14P3HR01	-	Human Rights	2	1	3	25	75	100
	14P3ZOED01	EDC	Sericulture	4	4	3	25	75	100
			Total	**30**	**24**		**165**	**435**	**600**
IV	14P4ZO11	Core- XI	Biostatistics and Research Methodology	6	5	3	25	75	100
	14P4ZO12	Core- XII	Evolution and Taxonomy	6	5	3	25	75	100
	14P4ZOE04	Elective- IV	First Aid and Home Nursing	6	4	3	25	75	100
	14P4ZOPR01	Core	Project and Viva Voce	12	5	-	-	80+20	100
Total				**30**	**19**	**-**	**75**	**325**	**400**
			Grand Total	**120**	**91**	**-**	**570**	**1630**	**2200**

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SEMESTER-I **CORE PAPER - I**

BIOCHEMISTRY AND BIOPHYSICS - 14P1ZO01
(For those admitted in June 2015 and later)

Contact hours per week - 05 **Contact hours per semester: 75**

4 CREDITS
SYLLABUS

UNIT -I (15Hours)

Atoms, Molecules and chemical bonds (Weak Bonds , Hydrogen bonds, Vander Waals force, hydrophobic effects, Electrostatic Force) Water: Biological Importance, pH and acid – base balance. Buffers- Biological Importance.

UNIT II (15Hours)

Carbohydrates - Classification, structure, function and properties. Metabolism of carbohydrates, TCA Cycle, Glycolysis, HMP Shunt.

Proteins–Classification, Structural organization of proteins (Primary, secondary, tertiary and quaternary structures). Amino acids- Definition, Classification and properties,

UNIT -III (15Hours)

Lipids –Classification, structure, Classification, structure, function and properties of simple, compound , complex Lipids . Biological importance of sterols, cholesterols, Bile acids. Fatty acid Biosynthesis and Beta oxidation of fatty acids.

UNIT -IV (15Hours)

Nucleic acids: Composition and Properties of nucleic acids. Enzymes- Definition, Classification and functions of enzymes – Co-enzymes, Iso-enzymes, Allosteric enzymes, Abzymes – Mechanism of Enzyme action – Michaelis- Menten Equation, Line Weaver Burk plot, Enzyme Inhibition and its types.

UNIT – V: (15 Hours)

Laws of entropy, Principles of Thermodynamics, High energy Phosphates, Redox potential, Oxidative phoshorylation, Coupled reaction, Group transfers, Biological energy transducers and ATP Synthesis.

REFERENCE BOOKS:

1. Nelson, D.I. and Cox, M.M. (2004) Lehninger Principles of Biochemistry, III Edition, Mac Millon Worth Publishers, New York.
2. .Satyanarayana,U and Chakrapani,U(2009)Essentials of Biochemistry,Books and Allied (P) Limited, Kolkata.
3. Jain, J.L. (2007) Fundamentals of Biochemistry, S. Chand & Co. Ltd., New Delhi.
4. Stryer, L. (2006) Biochemistry, W.H. Freeman and Co., New York.
5. Chatterjee, H.N. and Spindle, R. (2005) Text Book of Medical Biochemistry, Jaypee Brothers, New Delhi.
6. Devlin, T.M. (2003) Biochemistry, Wiley-Liss, New York.

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SEMESTER-I **CORE PAPER - II**

CELL AND MOLECULAR BIOLOGY – 14 P1ZO02
(For those admitted in June 2015 and later)

Contact hours per week: 05 **Contact hours per semester: 75**

4 CREDITS
SYLLABUS

UNIT I (15 Hours)

Microtome- Tissue Preparation, Sectioning, Mounting and Staining Techniques, Micrometry, Principles of Electron, Optical, and Phase contract Microscope, SEM, Scanning Transmission EM, Spectroscopy, Mass spectroscopy, X- Ray Diffraction Analysis.

UNIT –II (15 Hours)

Plasma membrane – Fluid mosaic model, cell permeability, Differentiation of cell membrane – microvilli, tight junctions, desmosomes, gap – junctions, connexon, communicating junctions. Functions of plasma membrane. Cell coat and cell recognition- fuctions of cell coat. Microtubules and microfilaments – structure and functions, Microtubules and microfilaments in cancer transformation

UNIT-III (15 Hours)

Endoplasmic reticulum – special functions of Rough Endoplasmic Reticulum and synthesis of exportable proteins. Golgi complex – Synthesis of glycosphingolipids , glycoproteins, secretory process in pancreas, insulin secretion and GERL region. Lysosome - cell digestive system – functions. Mitochondria – Structure and Function, Respiratory chain, Ribosome – prokaryotic and eukaryotic ribosomes.

UNIT-IV (15 Hours)

Chromosomes – Eu chromatin and Hetero chromatin chromosome, giant chromosome. DNA – structure Replication as semi – conservative. RNA – types and their role cellular activities. Cell division- Cell Cycle– Mitosis – Amitosis – Mitotic apparatus, Meiosis – Synaptonemal complex and significance. Cell aging.

UNIT-V (15 Hours)

Protein synthesis – Transcription in prokaryotes and Eukaryotes. RNA processing – Capping, polyadenylation, introns, exons. Translation– initiation, elongation and termination of polypeptide chain synthesis. Gene regulation in prokaryotes – Lac operon, trp operon. Gene regulation in Eukaryotes

REFERENCE BOOKS:

1. Gupta, P.K. (2007) Cell and Molecular Biology, Rastogi Publications, Meerut.
2. Derobertis, E.D.P. and E.M.F.D. Derobertis (2007) Cell and Molecuar Biology, Lea and Fabiger International Edition, Philadelphia.
3. Watson, J.D, Basker, T.A., Bell, S.P., Gann, A., Levine, M and Losick, R (2004) "Molecular biology of the gene'', Pearson Education Pvt. Ltd., Singapore.
4. Bruce, A, Alexander, J, Julian, L, Martin, R, Keith R, and Peter, W, (2002) Molecular Biology of the Cell, Garland Science, Taylor Francis Group, New York.
5. Cooper, G.M. (2001) The cell- A Molecular Biological Approach, ASM Press, Washington.
6. Karp, G. (1985) Cell Biology, Mc Graw Hill Book Company, New York.

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SEMESTER-I **CORE PAPER - III**

MICROBIOLOGY - 14P1ZO03
(For those admitted in June 2015 and later)

Contact hours per week: 05 **Contact hours per semester: 75**

4 CREDITS
SYLLABUS

UNIT – I (15 Hours)

History of Microbiology, Contribution of - Anton Von Leeuwenhoek, Edward Jenner, Louis Pasteur and Robert Coach -General Structure of Bacteria, Fungi, Virus.

UNIT – II (15 Hours)

Cultivation of Micro organism- Pure culture techniques- Isolation and Culture of Microbes and Staining Techniques. Microbial control: Physical agent: Moist heat, dry heat HEPA filter, chemical agent: Phenol, formaldehyde and alcohol.

UNIT - III (15 Hours)

Food microbiology- Preservation of Food, Contamination, Spoilage- Bacterial and Fungal. Food Preservation. Food Borne diseases- Causes, Sources, Mode of Transmission, Symptoms and Control measures of Salmonella, Amebiasis, Botulism and Aspergillus.
Microdiagnosis of Milk, Yogurt, Cheese. Bacteriology quality of Milk and Milk products.

UNIT IV (15 Hours)

Water Microbiology- Microbes in Water, Water borne diseases Microbial analysis in potable water- SPC, MPN and membrane filter techniques. Methods of sewage treatment and disposal. Soil microbes -Role of microbes in nitrogen fixation – Bio fertilizers and Bio pesticides.

UNIT – V (15 Hours)

Fermentation, Production of Ecomically important organic acids, Citric acid and Lactic acid, Production of antibiotics- Pencillium, Streptomycin- Single cell protein. Microbiological treatment of Industrial waste.

REFERENCE BOOKS:

1. Ananthanarayan, R., and Jayaram Paniker, C.K. (2006) Text book of Microbiology, Orient Longman Ltd., New Delhi.
2. Purohit, S.S., (2006) 1995, Microbiology, V Edition, Agrobios (India) Publishers, Jodhpur.
3. Kamal, G.P. Rao and D.R. Modi (2005) Concepts of Microbiology, International Book Distributing Co., Lucknow.
4. Dubay, R. C. and Maheshwari D. K. (2005) Text Book of Microbiology, S. Chand & Co. Ltd., New Delhi.
5. Prescott, L.M., Harly, J.P. and Ulein, B.A. (2004) Microbiolgy (IV Edi). WMC, Broun Publisher, USA.
6. Pelczar, M.J. (2002) Microbiology, McGraw-Hill Education India Ltd., New Delhi.
7. Sarma, J.B. (2001) Medical Microbiology, Paras Publishing, Hyderabad.
8. Modi, H.A. (1995) Elementary Microbiology Vol I & II AKTA Prakash, Noida.

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SEMESTER-I **CORE PAPER – IV**

IMMUNOLOGY - 14P1ZO04
(For those admitted in June 2015 and later)

Contact hours per week: 05 **Contact hours per semester: 75**

4 CREDITS
SYLLABUS

UNIT –I (15 Hours)

Cells involved in the immune system, Innate immunity- factors involved in innate immunity, active and passive acquired immunity. Lymphoid organs: Thymus bursa of fabricius and bone marrow, lymph node, spleen, MALT, Payer's patches, tonsils-brief account . Vaccines.

UNIT -II (15 Hours)

Humoral immunity: Primary and secondary immune response; Mechanism of antibody production, cell mediated immunity, MHC Classes and Structure. General Structure and Function of Immunoglobulin.

UNIT - III (15 Hours)

Cytokines, interleukins and compliments system: Sources and origin. Complement activation- classical pathway and alternative pathway. Biological functions of complement. Complement fixation.

UNIT – IV (15 Hours)

Immunogen and hapten, types of antigen. HLA, Antigenic determinants. Antigen-antibody reaction; immune complex, specificity, binding sites, binding forces, Bonus effect and cross reaction. Hypersensitivity: Factors, types and classification.

UNIT – V (15 Hours)

Transplantation Immunology- Auto immune diseases. Primary and secondary immunodeficiencies: T lymphocyte deficiency, DiGeorge anomaly, B lymphocyte deficiency – X-linked gamma globulinaema. Combined B and T lymphocyte deficiency: severe combined immunodeficiency. AIDS. Immunotherapy- Any two Techniques.

REFERENCE BOOKS:

1. David, Brostoff and Roitt (2006) Immunology, 7th Edn., Mosby & Elsevier Publishing, USA.
2. Janeway, Travers, Walport and Shlomchik, (2005) Immuno Biology- The immune system in health and disease, 6th Edn., Garland Science Publishing, New York, USA.
3. Richard, Thomas, Barbara, Janis, (2003) Kuby Immunology, 5th Edn, W. H. Freeman and company, New York, USA.
4. Playfair, J.H.L, (2001) Immunology at a glance 7th edn. Blackwell Scientific Publications, Oxford.
5. Stewart, S. (2001). Immunology, Immunopathology and Immunity, 6th Edn. ASM Press, Washington D.C.
6. Hyde, R.M. (1992) immunology, National Medical Series, London.
7. Kuby, J. (1997) Immunology, W.H. Freeman &Co., New York.
8. Peakman, M and D. Vegani, (1997) Basic and clinical Immunology, Churchill and Livingstone, New York.
9. Roitt, I.M., (1988) Essential Immunology, 7th Edn., Oxford ELBS Edition, London.

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SEMESTER-I **CORE PRACTICAL –I**

BIOCHEMISTRY, CELL AND MOLECULAR BIOLOGY, MICROBIOLOGY AND IMMUNOLOGY- 14P1ZOP01

(For those admitted in June 2015 and later)

Contact hours per week: 05 **Contact hours per semester: 70 Hours**

4 CREDITS

SYLLABUS

I- Biochemistry

1. Quantitative estimation of carbohydrate, Protein and Lipids
2. Estimation of Haemoglobin content in Blood.
3. Urine Analysis- Qualitative analysis of Sugar, Albumen and Ketone Bodies.

II- Cell and Molecular Biology

3. Micrometry -measurement of cell size.
4. Study of mitotic and meiotic cell divisions-temporary squash preparations.
5. Temporary squash preparation of salivary gland in chironomous larva in giant chromosome.

III- Microbiology

6. Simple staining and gram staining techniques.
7. Study of bacterial motility by hanging drop method.
8. Preparation of Media for Bacterial Culture
9. Bacterial Analysis of Milk- Methylene Blue reduction test

IV. Immunology

10. Autoclaving, Electrophoresis techniques- Demo.
11. Demonstration of Antigen- Antibody reaction by interfacial ring test.

Spotters

1. Colorimeter, pH Meter, Mitosis and Meiosis Stages, Entameoba, Salmonella Typhi, Bacillus sp.
2. Tour report of the visit to food preservation, food fermentation and dairy industries

REFERENCE BOOKS:

1. Wilson, K. and Walker, J. (1994) Principles and Techniques of Practical Biochemistry, Cambridge University Press, Cambridge.
2. Jayaraman, J. (1981) Laboratory Manual of Biochemistry, New Age International (P) Ltd., Publishers, New Delhi.
3. Bowen, W.C. (1980) Experimental Cell Biology, Mac Millan Publishing Co., New Delhi.
4. Dewit, W.C. (1977) Biology of the Cell- Lab Explorations, Saunders Co., New Delhi.
5. Alkamo, P.A. (2003) Manual of Microbiology, V.H.A. Publishers, New York.
6. Gunasekaran, P. (2001) Laboratory Manual in Microbiology, New Age International (P) Ltd., Chennai.
7. State level Workshop on Immunological Techniques (2000) PG and Research Department of Zoology, American College, Madurai.
8. Wilson, K and Walker, J. (1994) Practical Biochemistry Principles and Techniques Cambridge University Press, USA.

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SEMESTER-I **ELECTIVE – I**

ECONOMIC ZOOLOGY - 14P1ZOE01
(For those admitted in June 2015 and later)

Contact hours per week: 05 **Contact hours per semester: 75**

4 CREDITS
SYLLABUS

UNIT I: (15 Hours)

Types of honey bees – Diseases and pests of bees – Harvesting and processing of honey – Types of Honey, Maintenance of Apiary, Instruments used in Apiculture.

Lac Culture : Types of Lac; Life cycle of Lac insect, Harvesting and Extraction of Lac; Uses and Enemies of Lac. Economic Importance

UNIT II: (15 Hours)

Types of birds for poultry – Diseases and pests – Egg and meat production – Poultry feed – Marketing of poultry products – Economic importance of poultry keeping – Problems in poultry keeping. Types of animals for animal husbandry – Disease and pests of animals – Economic importance of animal husbandry.

UNIT III: (15 Hours)

Aqua culture- Site selection and construction ,Pre stocking and post stocking management of Nursery, rearing and stocking ponds, Fish products and byproducts, Fish preservation.

Prawn culture - Methods of prawn fishing, spoilage of prawns, preservation and processing of prawns, Export of prawn, Pollution and prawn fishery

UNIT IV: (20 Hours)

Species of earthworm used in vermiculture- Requirements for vermiculture- Compost Production, Steps involved in Vermicompost. Natural enemies and their control-Harvesting vermicompost & worms - Marketing of vermicompost & worm, Role of vermicompost as fertilizer in agriculture.

UNIT V: (10 Hours)

Immunization- Serum theory- Animal oriented medicine -Advancement in pharmaceuticals- Economic importance of snakes and mammals.

REFERENCE BOOKS:

1. Jawaid, A. and Sinha, S. P. (2008) A Handbook of Economic Zoology. S. Chand Group Publishers, New Delhi.
2. Khan, A. A. (2007) Encyclopedia of Economic Zoology. 2 vols. Anmol Publications Pvt. Ltd., New Delhi.
3. Upadhyay, V.B. (2006) Economic Zoology. Rastogi Publications, Meerut, India.
4. Nigam, H.C. (2006) Modern Trends in Biology & Economic Zoology, Vishal Publishing. Co., Jalandhar.
5. Jabde and Pradip V (2005) Text Book of Applied Zoology, Discovery Publishing House, New Delhi.
6. Shukla, G.S. and Upadhya, V.B. (2005) Economic Zoology, Rastogi Publications, Meerut, India.
7. Tomar, B.S. (2004) Introduction to Economic Zoology, Emkay Publications, New Delhi.
8. Yadav, M (2003) Economic Zoology. Discovery Publishing House, Rastogi Publications, Meerut.
9. Ravindranathan, K.R. (2003) Economic Zoology, Dominant Publishers & Distributors, New Delhi.
10. Jangi, B. S. (1991) Economic Zoology. CRC, first edition, New York.

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SEMESTER-II
CORE PAPER –V DEVELOPMENTAL BIOLOGY – 14P2ZO05
(For those admitted in June 2015 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT– I: (15 Hours)

Gametes- Sperm, Ova, Types of Sperm, Ultra structure of Human sperm, Gametogeneiss, Spermatogenesis, Sperm motility and egg activation – Spermatogenesis. Oogeneis- Types of Egg, Ultra structure of Mammalian egg.

UNIT– II: (15 Hours)

Fertilizatation– Process and significance – Activation of egg, Sperm – egg interaction. Post – fertilization changes. Parthenogenesis (Natural and Artificial). Cleavage – Morphogenetic gradients in the egg cytoplasm – Chemical changes during cleavage – Pattern and factors influencing cleavage – Polarity and gradient in fertilized egg.

UNIT – III: (15 Hours)

Morphogenetic movements – Nucleocytoplasmic interactions in morphogenesis – Principles, Patterns and Physiology of gastrulation (Mammal). Organogenesis – (Limb, heart, kidney and brain) Foetal membranes – Placenta – classification and physiology.

UNIT – IV: (15 Hours)

Morphological and biological changes associated with metamorphosis – Hormonal control of amphibian metamorphosis – Neuro-endocrine control of insect metamorphosis. Regeneration –Experimental evidence for Regeneration. – Regeneration as developmental phenomenon – Polarity and gradient in Regeneration.

UNIT – V: (15 Hours)

Embryonic fields embryonic induction and Organization, Types of Differentiation – Nuclear factors – Chemical basis of gene action in development. Genes and differentiation – Factors involved – Events in gene action Information genes and development – Inductors and organizers.

REFERENCE BOOKS:

1. Lewis Wolpert (2007) Principles of Development (III edition) Oxford University Press, UK.

2. Gilbert, S.F. (2006) Developmental Biology, 8th edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
3. Gilbert, F.S. (2003) Developmental Biology, 7th Edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
4. Balinsky, B.I. (2004) An Introduction to Embryology, 5th edition, Thomas Asia Pvt. Ltd, Chennai.
5. Balinsky, B.L, (1981) An Introduction to Embryology, Vth Edition, Saunders Co., Philadelphia.
6. Berrill, N.J. (1986) Developmental Biology, Tata McGraw Hill Publication Co. Ltd., New Delhi.
7. Longo, F.T. (1987) Fertilization, Chapman and Hall, New Delhi.
8. Saunders, J.W. (1982) Developmental Biology, Mc Millan Pub. Co., New York.

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SEMESTER-II **CORE PAPER –VI**

ANIMAL PHYSIOLOGY -14P2ZO06
(For those admitted in June 2015 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT – I: (10 Hours)

Introduction – Physiology of digestion - carbohydrates, proteins and lipids – Physiology of absorption and Assimilation. Nutrients, Nutrition in Pregnancy, Infant Nutrition. Balanced diet.

UNIT – II (15 Hours)

Types of Respiration – Physiology of respiration in Man, Respiratory Quotient Values– Respiratory pigments, composition and functions O_2 and CO_2 transport in animals. Circulation

Types of hearts- Working Mechanism of Heart, Cardiac cycle, Electrocardiogram – control of heart beat. Factors influencing circulation and coagulation of blood – Haemolysis, Jaundice, ESR, Haemodynamics.

UNIT – III (20 Hours)

Nature and types of excretory products – Ammonotelism, Urotelism, Uricotelism, Patterns of excretion– Excretory organs- Excretory mechanism in invertebrates and chordates – Physiology of excretion in Mammals – Regulation. Thermoregulation in Homeotherms, Poikilotherms and Heterotherms – Aestivation and Hibernation.

UNIT – IV (15 Hours)

Types of neurons –Structure of typical nerve cell. Transmission of Nerve impulses Axonomic and Synaptic Transmission - Autonomic nervous system organization and functions – Reflex action.

Muscles and types, Ultra structure of skeletal muscles – Chemical composition – Mechanism of muscle contraction – Regulation and energetics of Muscle contraction.

UNIT – V (15 Hours)

Chronobiology – Biological clock and Photoperiodism. Physiology of Photoreception- Working of mammalian eye.

Physiology of Photoreceptors- Working of Mammalian ear. Physiology of Migration in fishes and birds.

REFERENCE BOOKS:

1. Moyes, C.D. and Schulte, P. M. (2006) Principles of Animal Physiology, Pearson Education Inc. Chennai.
2. Tortora, G. J. and Derrickson, B. (2006) Principles of Anatomy and Physiology, 11th edition, John Wiley and Sons Inc. USA.
3. Richard W. Hill, Gordon A. Wyse (2004) Animal Physiology, Second Edition, Sinauer Associate, Inc Publishers, USA.
4. Guyton, A.C. (2001) Text book of Medical Physiology 10th edition W. B. Saunders Company, Philadelphia.
5. Prosser, C.L. (1973) Comparative Animal Physiology, 3rd Edtion, W.B. Saunders & Co. Philadelphia.

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SEMESTER-II **CORE PAPER –VII**

ADVANCED GENETICS -14P2ZO07
(For those admitted in June 2015 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

UNIT – I: (15 Hours)

Gene concept – fine structure of gene – one gene one polypeptide concept.

Human Genetics

Gene and metabolic pathways. Inborn errors of metabolism in man. Haemoglobin disorders – sickle cell anemia and thalessemia.

Human karyotype preparation and chromosomal syndromes in man – Down, Turner's and Kleinfelter's syndromes.

UNIT – II: (20 Hours)

Evidence of genetics materials in Bacteria – genetic exchange and recombination in bacteria – conjugation, transformation and transduction. Viral genetics – bacteriophage.

Enzyme – regulatory mechanism – operon concept – GAL and LAC operon system – gene regulation in protein synthesis in prokaryotes and eukaryotes.

UNIT – III: (10 Hours)

Population and gene poll – Hardy – Weinberg Law – genetic equilibrium – factors affecting Hardy – Weinberg equilibrium. Calculation of genetic frequencies for complete dominance, multiple alleles and sex-linked gene.

UNIT – IV: (15 Hours)

Genetics of races and species formation – genetic load – genetic polymorphism. Dosage compensation – X inactivation – genomic imprinting.

UNIT – V: (15 Hours)

Chromosomal and point mutation, spontaneous and induced mutation, mutagens: physical, chemical and biological – genetic changes in Neoplasia in man.

Applied Genetics

Application of genetics in animal breeding – application of genetics in crime and law – DNA finger printing. Genetics basis of twins.

REFERENCE BOOKS:

1. Klug, W.S., Cummings, M.R., Spencer, C and Palladino, M.A. (2008) Concepts of Genetics, 9th edition (2008), Benjamin Cummings, Canada.
2. Benjamin Lewin (2008) Genes IX, 9th edition, Jones and Barlett Publishers Inc. London.
3. Snustad D. Peter and Simmons J. Micheal, (2006) Principles of Genetics, 4th edition, John Wiley and Sons. Inc., USA.
4. Daniel J. Fairbanks, W. Ralph Andersen (1999) Genetics, Brooks/Cole Pub Co., USA.
5. Eldon J. Gardner, D.P. Snustad, M.J. Simmons, and D. Peter Snustad (1991) Principles of Genetics, 8th edition, John Wiley and Sons. Inc., USA.
6. David Freifelder (1987) Microbial Genetics, Jones & Bartlett Co., USA.
7. Leon A. Snyder, David Freifelder, Daniel L. Hartl (1985) General Genetics, Jones and Bartlett., London.
8. Monroe W. Strickberger, (1968), Genetics, 3rd edition, Macmillan Publishing Co. Bangalore.

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SEMESTER-II **ELECTIVE –II**

MEDICAL LABORATORY TECHNIQUES -14P2ZOE02

(For those admitted in June 2015 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT – I (15 Hours)

The laboratory: Safety, Contaminants- Physical, Chemical, Biological Contaminants. – Universal work precautions (NWP) for laboratory personnel. Disposing of Biomedical waste.

UNIT – II (15 Hours)

Haemoglobin content, Differential Count, Haematocrit, packed cell volume, MCH, MCHC, MCV, Erythrocyte sedimentation rate, RBC fragility test, platelet count. Reticulocytocrit, haemorrhagic disorders, clotting time, Bleeding time, prothrombin time.

UNIT – III (15 Hours)

Knowledge and skill in the study and analysis of urine. Physical parameter, Colour, odor, p^H, Density. Chemical parameters routinely required to be analysed – Sugar, Albumin, Ketone bodies and their clinical significances pregnancy tests.

UNIT – IV (15 Hours)

Specimen collection for microbial diseases- Types of Specimens, Parasitic diseases- Staining techniques Analysis of faeces, semen, and cerebrospinal fluid for clinical investigation.

UNIT – V (15 Hours)

Molecular diagnosis for diseases- Techniques – RIA, ELISA, WESTERN BLOT and WIDEL TEST, DNA finger printing.

REFERENCE BOOKS:

1. Sood and Ramnik (2009) Medical Laboratory Techniques, Jaypee Brothers, New Delhi.
2. Kanai L. Mukherjee and Swarajit Ghosh (2009) Medical Laboratory Techniques, , Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
3. B. S. Chauhan (2009) Principles of Biochemistry and Biophysics, first edition, Luxmi publishers, New Delhi.
4. Garrod, L.P. (2008) Medical Laboratory Techniques, BMJ publishers, USA.
5. Estridge, B.H., Reynolds, A.P. and Walters N.J. (2007) Basic Clinical Laboratory Techniques, Cengage Learning, Hyderabad.
6. Singh, A. and Singh, R (2004) Biophysical Chemistry (Principles and Techniques) Campus Books International, New Delhi.

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SEMESTER-II **ELECTIVE –III**

FISHERY BIOLOGY - 14P2ZOE03
(For those admitted in June 2015 and later)

Contact hours per week: 05 Contact hours per semester: 70

4 CREDITS

SYLLABUS

UNIT I (10 Hours)

Introduction – importance of fisheries. Aim of fish culture Qualities of culturable fishes. Types of fish culture – monoculture – composite culture- Integrated fish culture – paddy cum fish culture. Construction and Maintenance of fish farm.

UNIT II (15 Hours)

Construction and maintenance of fish farm – Type of fish ponds – Management of Fish culture – Breeding – Types of breeding- Induced breeding.

UNIT III (10 Hours)

Harvesting – Methods of fishing – Electric fishing. Transportation and marketing – Structure of a Fish market. Marketing system – co –operative system – National Co – operative Development Corporation capital market. (NCDC)

UNIT IV (20 Hours)

Preservation and processing – Fish spoilage – Preservation and processing. Fish –Rigor mortis – Spoilage. Principles and process of Preservation Methods of preservation.

UNIT V (15 Hours)

Fish diseases- Parasitic, Non- Parasitic, Non- Parasitic diseases, Protozoan disease, and Nutritional disorder.

REFERENCE BOOKS:

1. Jawaid, A. and Sinha, S. P. (2008) A Handbook of Economic Zoology. S. Chand Group Publishers, New Delhi.
2. Shukla, G.S. and Upadhya, V.B. (2005) Economic Zoology, Rastogi Publications, Meerut, India.

3. Kamaleswar pandey and. Shukla, J.P. (2005) Fish and Fisheries, Rastogi Publications, Meerut.
4. Yadav, M (2003) Economic Zoology. Discovery Publishing House, Rastogi Publications, Meerut.
5. Shanmugam, K. (1992) Fishery Biology and Aquaculture, Leo Pathippagam, Chennai.
6. Jingran, V.G. (1983) Fish and Fisheries of India, 2nd Edition, Hindusthan Publications, New Delhi.

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SEMESTER-II **CORE PRACTICAL –II**

DEVELOPMENTAL BIOLOGY, ANIMAL PHYSIOLOGY AND ADVANCED GENETICS - 14P2ZOP02

(For those admitted in June 2015 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

I: Developmental Biology

1. Staining and mounting of chick blastoderm of various stages.
2. Study of different types of placenta (Specimen).
3. Amphibian metamorphosis: Evaluation of Progressive and Retrogressive changes.

II. Animal Physiology

4. Survey of digestive enzymes in cockroach
6. Determination of rate of salt loss in fish using different experimental media.
7. Determination of RQ in fish in relation to light and temperature (Fish)
8. Determination of Urea, Uric Acid, Ammonia and Creatine in the urine sample.

III: Advanced Genetics

10. Scheme of Pedigree analysis
11. Drosophila culture techniques
12. Drosophila –Observation of Mutant Wings and Eyes.
13. Localization of Barr body in the buccal smear (Squamous epithelial cells of man).
14. Isolation of DNA, Crude method, Gene pool Experiment- Hardy Weinberg law.

Spotters.

Kymograph, Types of Placenta, Types of Egg, Human Sperm, Human Ovary, Pituitary Gland, Adrenal Gland, Adipose Tissue, Smooth Muscle, Striated Muscle

REFERENCE BOOKS:

1. Gilbert, S.F. (2006) Developmental Biology, 8th edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
2. Balinsky, B.I. (2004) An Introduction to Embryology, 5th edition, Thomas Asia Pvt. Ltd, Chennai.
3. Moyes, C.D. And Schulte, P. M. (2006) Principles of Animal Physiology, Pearson Education Inc. Chennai.
4. Prosser, C.L. (1973) Comparative Animal Physiology, 3rd Edition, W.B. Saunders & Co. Philadelphia.
5. Benjamin Lewin (2008) Genes IX, 9th edition, Jones and Barlett Publishers Inc. London.
6. Monroe W. Strickberger, (1968), Genetics, 3rd edition, Macmillan Publishing Co. Bangalore.

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SEMESTER -III **CORE PAPER-VIII**

ANIMAL BIOTECHNOLOGY -14P3ZO08
(For those admitted in June 2015 and later)

Contact hours per week - 06 Contact hours per semester –90 Hours

5 CREDITS
SYLLABUS

UNIT I: Introduction (15 hours)

Historical background, Restriction enzymes, Cloning and Expression Vectors- Plasmids, Cosmids and Phagemids. Methods of gene isolation, DNA sequencing Techniques, Automated DNA sequencing, PCR – Types and applications, Gene transfer methods.

UNIT II: Animal cell culture (15 hours)

Tissue culture, Organ culture - techniques, Advantages and applications, Animal tissue culture media, Cell propagation, Preservation and storage of cells, Detection of contamination, Safety consideration in laboratory cell culture.

UNIT III: Artificial animal breeding (15 hours)

Artificial insemination, Transplantation, gene therapy, in-vitro fertilization and embryo transfer. Production and use of transgenic animals, Biotechnology in Aquaculture- Gynogenesis, androgenesis. Transgenic fishes, Ethics of transgenic animals.

UNIT IV: Animal health and biotechnology (15 hours)

Animal health - disease diagnosis, Monoclonal Antibodies - Prophylaxis - vaccines - Vaccines in animal disease, Antimicrobial drugs and their sensitivity tests.

UNIT V: Applications and issues related to Biotechnology (15 hours)

Bio fertilizers, Enzymes in detergents and leather industries, Biofuel, biogas, Bioethanol. Safety measures in biotechnology, Bioethics, Intellectual Property Rights and Patenting.

REFERENCE BOOKS:

1. Ranga, M.M. (2003) Animal Biotechnology, Agrobios Publishers, India,
2. Dubey, R.C. (2006) A textbook of Biotechnology, S. Chand Company Ltd. New Delhi.
3. Satyanarayana, U. (2010) Biotechnology, Books and Allied Pvt Ltd. Kolkata.
4. Pradeep Parihar, (2004) A textbook of Biotechnology, Student Edition. Jodhpur.
5. Kumar, H.D. (2008) Modern concepts of Biotechnology, Vikas Publishing House Pvt Ltd., New Delhi.
6. Sasidhara, R. (2006) Animal Biotechnology, MJP Publishers. Chennai.

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SEMESTER- III **CORE PAPER-IX**

GENERAL AND APPLIED ENTOMOLOGY - 14P3ZO09
(For those admitted in June 2015 and later)

Contact hours per week - 06 **Contact hours per semester – 90 Hours**

5 CREDITS
SYLLABUS

UNIT I (15 Hours)

Key characters of insect orders- economic importance with examples for the orders: Orthoptera, Hemiptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera- Insects of agriculture importance - Types of damage to plants by insects- classification of insect pest- Reasons for the insects attaining pest status.

UNIT II (15 Hours)

Nature of damage, life cycle and control measures of any four pest affecting the following crops: paddy, sugarcane, cotton, and stored products. Nature of damage, lifecycle and control measures of any two pests each of cattle and poultry.

UNIT III (10 Hours)

House holds insects and their control any two plant diseases. Cockroach, Lepisma and carpet beetle- Insects damaging house hold goods- Insect vectors of human diseases: brief account on vector biology, pathogens involved, disease transmitted and control measures of mosquito, housefly and flea. Insect vectors of plant diseases- *Bemisia* tabaci, white fly and leaf hoppers.

UNIT IV (10 Hours)

Biology and economic importance of silkworm, Honey bees and lac insects- Insect galls- NPV. Insects in medicine- Helpful insects: predators- parasites- weed killers- soil builders- scavengers.

UNIT V (15 Hours)

Classification of insecticides based on the mode of entry, mode of action and chemical nature- merits and demerits of chemical methods of pest control, Pest resurgence. - Biological method of pest control, Integrated pest management (IPM): definition, principle, merits and demerits- precautions in handling pesticides-pesticide poisoning, first aid.

REFERENCE BOOKS:

1. David, B.V. (2001) Elements of Economic Entomology, Popular Book Depot, Chennai.
2. Dunston, P. Ambrose (2004) The insects: Structure, Function and Biodiversity, Kalyani Publications, New Delhi.
3. Nalina Sundari, M.S. and Santhi, R. (2006) Entomology, MJP Publishers, Chennai.
4. Srivastava, K.P. (1993) Text Book of Applied Entomology, Vol. I & II, Kalyani Publications, New Delhi.
5. Nayar, K.K., Ananthakrishnan, T.N. and David, B.V. (1982) General and Applied Entomology, Tata Mc Graw Hill, New Delhi.
6. Ayyar, T.V.R. (1984) Handbook of Economic Entomology for South India, Books and Periodicals, Supply Service, New Delhi.

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SEMESTER- III **CORE PAPER- X**

ENVIRONMENTAL BIOLOGY - 14P3ZO10
(For those admitted in June 2015 and later)

Contact hours per week - 06 **Contact hours per semester – 90 Hours**

5 CREDITS

. SYLLABUS

UNIT I (15 Hours)

Definition and concepts of ecosystem – Types of ecosystem (pond, forest, desert, cropland and estuarine ecosystem). Energy flow in ecosystem food chains, food webs and ecological pyramids.

UNIT II (15 Hours)

Definition of biodiversity, value of biodiversity, threads to biodiversity, endemic and endangered species of India. In-situ conservation – protected areas, National parks, wild life sanctuaries, conservation projects – tiger, elephant. Ex-situ conservation Zoological parks, Germ plasm banks, Biosphere reserves, National bureau of animal genetic resources.

UNIT III (15 Hours)

Introduction -Types of pollution- effects and control measures. Air, water, soil Pollution. Biomagnification - eutrophication – environmental impact assessment (EIA), bio indicators- bio remediation-bio degradation.

UNIT IV (15 Hours)

Resources – types, water resources management, Forest resources and chipko movement. Energy resources – renewable and non - renewable. Conventional and non – Conventional sources of energy.

UNIT V (15 Hours)

Biomes, temperate deciduous forest, temperate grass land, savanna, tropical rain forest and desert, ecotone, estuary, concepts of ecological niche, ecological succession; one example for primary succession, secondary succession, mono climax theory, poly climax theory.

REFERENCE BOOKS:

1. Agarwal, K.C. (1999) Environmental Biology, Agro Bolanica, Bikaner.
2. Castri, F.D and Younes, T. (1996) "Biodiversity Science And Development" Cab Int., Wallingford, UK.
3. Gowrikrishna Dasmohapatra (2009) Environment and Ecology (III Edn) VIKAS Publishing House Pvt Ltd, New Delhi.
4. Ahluswalia, V.K. and Sunita Malhotra (2009) Environmental Sciences, Ane Books Pvt Ltd, New Delhi.
5. Misra, S.P and Pandey, S.N. (2009) Essential Environmental Studies, Ane Books Pvt Ltd, New Delhi.
6. Ananthakrishnan, T.N. (2000) Bioresources Ecology, Oxford and IBH Publishing Co., New Delhi.
7. Kormondy, E.J. (2007) Concepts of Ecology, Frentice Hall of India, New Delhi.
8. Odum, E.P., (2003) Fundamentals of Ecology, Holt Saunders, Philadelphia.
9. Odum, E.P., (2000) Basic Ecology, Holt Saunders, Philadelphia.
10. Siddiqui, K.A., (2000) Pollution conservation and forestry, Kitab Mahal, New Delhi.

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SEMESTER III **CORE PRACTICAL-III**

GENERAL AND APPLIED ENTOMOLOGY,
ENVIRONMENTAL BIOLOGY AND ANIMAL BIOTECHNOLOGY – 14P3ZOP03
((For those admitted in June 2015 and later)

Contact hours per week - 06 Contact hours per semester – 75 Hours

5 CREDITS

SYLLABUS

I. GENERAL AND APPLIED ENTOMOLOGY

1. Preparation of key for the identification of insects using dichotomous Key.
2. Different types of Mouthparts of insects, their feeding habits (Diagram and description).
3. Study of insects: Beneficial, Harmful and insects related to human welfare.
4. Observation of important pests of paddy, sugar cane, cotton, pulses, vegetables, fruits and stored products to understand the life history of insects in relation to the life history of plants
5. Field study to understand the various methods of pest managements: (Observation of bee hives in agro ecosystem.
6. A report on green measures in their native place.

II. ENVIRONMENTAL BIOLOGY

7. Estimation of dissolved O_2 in given water sample (Winkler's method).
8. Estimation of CO_2 content in given water sample.
9. Identification and description of fresh water plankton. (Daphnia, Cyclops, Volvox, Paramecium, Euglena).

III. ANIMAL BIOTECHNOLOGY

10. Pasteurization of milk.
11. Demonstration of Blotting and SDS PAGE techniques.
12. Tour reports of the visits to Biotechnological Research Lab / Industries.

IV. RECORD SUBMISSION

REFERENCE BOOKS:

1. David B.V. (Ed.), (1992) Pest Management and Pesticides: Indian Scenario, Namrutha Publications, Madras.
2. Hill D.S. (1987) Agricultural Insect Pests of Tropics and their Control, Cambridge University Press, UK.
3. Michael P. (1984) Ecological Methods for field and Laboratory Investigations, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
4. Nayar N.K. Ananthakrishnan T.N. and David B.V. (1983) General and Applied Entomology, Tata Mc Graw Hill Publishing Company, New Delhi.
5. Brown, T.A. (2006) Gene cloning -An Introduction, Stanley Thrones (Publishers) Ltd., Cheltenham, U.K.

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SEMESTER III

14P3ZOED01– SERICULTURE (EDC)
(For those admitted in June 2015 and later)

Contact hours per week - 04 **Contact hours per semester – 75 Hours**

4 CREDITS

SYLLABUS

UNIT I (10 Hours)

History of Sericulture: History, Silk Role, Silk production, Scope and limitations of sericulture Industry- Life Cycle of Silkworm: *Bombyx mori* Morphology, stages and life cycle.

UNIT II (15 Hours)

Soil sampling, Preparation of land for mulberry cultivation, Study of mulberry varieties Application of green manure- compost and Farm Yard Manure- Methods of plantation and leaf production- Identification of mulberry diseases and pests and control measures.

UNIT III (15 Hours)

Grainage operations and activities. Silkworm rearing- Rearing environment condition-shoot harvest method of rearing- spacing and leaf requirement in different stages. Dis-infection of rearing houses and appliances- handling of eggs- Transporting of eggs- hatching. –Brushing- young age and late age rearing- Spinning and mounting- Harvesting- transportation and marketing.

UNIT IV (10 Hours)

Silkworm diseases, symptoms and control measures: Protozoan disease-.Pebrine, Bacterial diseases- Flacherie, Viral diseases- Grasserie, Fungal diseases- Muscardine. Pest of Silkworm.

UNIT V (10 Hours)

Materials for reeling, stifling and cocoon cooking and brushing reeling- raw silk reeling- raw silk testing -classification of silk -By products of sericulture- Economics of sericulture -Self-employment in mulberry leaf production, seed production, rearing and reeling- Role of women in Indian sericulture .

REFERENCE BOOKS:

1. Rangasamy, G. (1987) Manual on sericulture FAO, Vol. I-IV, Agriculture service bulletin, CSB, Bangalore, INDIA.

2. Dandin, S.B. (2004), Hand book of new sericulture technologies, Central Silk Board, Board, Bangalore, pp 287.

3. Ganga G. and J. Sulochana Chetty (2005) An introduction to sericulture, 2nd Edition Vijay Primlani Publ. For Oxford and IBH Publ. Co. New Delhi.

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SEMESTER IV **CORE PAPER-XI**

BIOSTATISTICS AND RESEARCH METHODOLOGY - 14P4ZO11
(For those admitted in June 2015 and later)

Contact hours per week - 06 **Contact hours per semester – 90 hours**

5 CREDITS
SYLLABUS

BIOSTATISTICS

UNIT I (15 hours)

Importance of Statistics in biology, samples and populations, variables in biology, Accuracy and Precision- primary and secondary data, types of biological data and graphical representation of the data (Histogram, Bar, Pie/ Polygon).

UNIT II (15 hours)

Measures of central tendency- Mean, Mode, Median- Concept of variation, Measures of variation - variance, standard deviation, coefficient of variation. Probability Distribution- Binomial and Poisson distribution- Normal Distribution, Regression and correlation analysis, Curve fitting.

UNIT III (15 hours)

Tests of simple hypothesis using normal and t-distribution, Types of errors, Tests of significance: Parametric and non-parametric tests, T-tests (One sample t-test, Two sample t-test, Paired t-test), Chi-square test for goodness of fit, F-test for comparing variance, one-way ANOVA.

RESEARCH METHODOLOGY

UNIT IV (10 hours)

Sources of literature collection. Format of a thesis, framing the title. Preparation of the first page. Precautions to be taken while preparing introduction, Historical resume and materials and methods. Format of presenting results, including tables, figures and photographs. The art of writing discussion and summary. Guidelines to be followed while writing bibliography.

UNIT V (15 hours)

Preparation of Scientific paper for publication in a Journal. Internet and e-journals. Computer aided techniques for data analysis, data presentation and slide preparation.

REFERENCE BOOKS:

1. Gupta, S.P., (2002) Statistical methods, Sultan Chand and Sons, Educational Publishers, New Delhi.
2. Gurumani, N. (2005) “An Introduction to Biostatistics”, II Edition, MJP Publishers, Chennai .
3. Gurumani, N. (2009) “Research Methodology for Biological Sciences”, MJP Publishers, Chennai.
4. Memering, D. (2000) The prentice Hall Guide to research Writing. Prentice Hall International, London.
5. Khan, I.A., and Khanum, A., 2004 Fundamentals of Biostatistics, Ukaaz Publications, London.
6. Mahajan, B.K. (1997) Methods in Biostatistics for medical students and research workers, 6th edn. Jaypee Brother’s Medical Publications Ltd., New Delhi.

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SEMESTER- IV **CORE PAPER-XII**

EVOLUTION AND TAXONOMY -14P4ZO12
(For those admitted in June 2015 and later)

Contact hours per week - 06 **Contact hours per semester – 55 Hours**

5 CREDITS

SYLLABUS

UNIT I (15 hours)

Introduction, Origin of life – Abiogenesis, Biogenesis, Biochemical origin of life, experiments Urey miller's experiments. Evidences of evolution (morphology and comparative anatomy, Embryology, Physiological and Bio – chemical, Paleontological and Genetic.

UNIT II (15 hours)

Geological time scale, Study of Fossils: Definition, Formation, Types and Determination of Age of Fossils. Evolution of Vertebrate groups, Origin of Man - Lamarckism - Neo Lamarckism, Darwinism – Neo Darwinism,

UNIT III (15 hours)

Mutation and their role in Evolution, Types of variation, Elemental forces of Evolution – mutation, Natural selection, Genetic drift, Recombination, Gene pool, gene frequency, Hardy Weinberg law and Evolution.

UNIT IV (15 hours)

Speciation, isolating mechanism, Neoteny, mimicry, coloration and its type's Adaptive radiation – Darwin's finches. Human evolution.

UNIT V (15 hours)

Nature of international code of Zoological nomenclature – Principles relating to nomenclature, New trends in taxonomy, Cladistics, Dendrogram, Molecular Principles in DNA finger printing.

REFERENCE BOOKS:

1. Dodson, E.V. (1960) Evolution process and product. East West Press, New Delhi.
2. Paulamos Moody (1978) Introduction to evolution. Kalyani Publishers, Ludhiana, New Delhi.
3. Kapoor, V.C. (1986). Theory and practice of animal taxonomy. Oxford & IBH Publishers Co., New Delhi.
4. Richa Arora (2009) Patterns of Evolution, Anmol Publishers, New Delhi.
5. Richa Arora (2004) Elements of Evolution, Anmol Publishers, New Delhi.
6. Dobzhansky, T. (1955) Evolution, Genetics & Man. Wiley Eastern Pvt. Ltd.
7. Stebbins, G.L. (1969) The basis of Progressive Evolution, University of North Carolina Press,
8. Strickberger, M.W. (2000) Evolution. Jones & Bartlett Publications.
9. Rastogi, V.B. (2003) Organic Evolution, Kedar Nath, Ram Nath.

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SEMESTER -IV **ELECTIVE- IV**

FIRST AID AND HOME NURSING -14P3ZOE04

(For those admitted in June 2015 and later)

Contact hours per week - 06 **Contact hours per semester – 65 Hours**

5 CREDITS

SYLLABUS

UNIT I (10 hours)

Principles of first aid – Snake bite, Dog bite, Insect bite, 108 service, First aid box and Laboratory first aid.

UNIT II (15 hours)

Fracture - Causes, Types, Signs and Symptoms. First aid – Treatment. Effect of heat, heat stroke, signs and symptoms and first aid.

UNIT III (15 hours)

Home nursing – Definition observation of patients, Conditions. Importance of habit observation. Clinical thermometer and its uses. Counting of pulse, Respiration, respiratory rate.

UNIT IV (10 hours)

Normal and abnormal blood pressure, Specific infectious diseases. Method of Nursing the patients suffering from illness..

UNIT V (15 hours)

Care of sick – Routine nursing care of sick. General application of heat – Hot baths and hot sponging warm baths and medicated baths. General application of cold bath and sponging.

REFERENCE BOOKS:

1. Shukla, G.S. and Upadhyay, V.B. (2005) Economic Zoology, Rastogi Publication, Meerut.
2. Indrani., T.K. (2006) First Aid for Nurses (1st edn.), Jaypee Brothers, Medical Publishers (P) Ltd. New Delhi.
3. Park. K (2004) Essentials of community health nursing (4th edn.) M/s Banarsidas Bhanot Publishers, Jabalpur.
4. Park. K. (2011) Text book of preventive and social medicine (21st edn.). M/s Banarsidas Bhanot Publishers, Jabalpur.

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF ZOOLOGY
M.Sc. DEGREE COURSE IN ZOOLOGY
SEMESTER- IV

PROJECT AND VIVA VOCE -14P4ZOPR01

Contact hours per week - 12 **Contact hours per semester – 175 Hours**

5 CREDITS

Rules Governing the Evaluation of Project and Viva-Voce

1. Each student shall select a topic for his/her Project work in consultation with his/her guide and the Head of the department.
2. The Project report should be submitted to the Controller of Examinations (PG Courses) through the Head of the Department one week prior to the commencement of the terminal Examinations. If a candidate fails to submit the project report within the stipulated time, he/she may be permitted to submit the same one day prior to date of *viva voce* examinations with late fee prescribed by the Principal. If the candidate fails to submit the project report one day prior to the date of *viva voce* examination, he/she may be permitted to submit the Project report within a period of one month from the date of conduct of *viva voce*, with extension fee prescribed by the Principal. If the candidate fails to submit the project report even after that extension period, he/she will be treated with on per with failures and he/she has to do another project and to submit the report after six months by paying fee prescribed the Principal.
3. Each student shall submit 2 copies of his/her Project report for valuation.
4. The Project report shall contain a minimum of 25 pages excluding bibliography and appendices.
5. The Project report shall be valued for a total of 80 marks out of which the external examiner and the Guide share 20 marks each. The sum of marks awarded by both the examiners shall be considered to be the final mark. For a pass in the Project report, the student should secure a minimum of 36 marks. If a student fails to get the minimum pass mark in the Project report, he/she shell be permitted to resubmit his / her Project report once again within a period of 6 months from the date of publication of the result.
6. For those candidates who have passed in the evaluation of Project report, there will be a *viva voce* examination on the above. The *vivo voce* carries a maximum of 20 marks and the guide and the external examiner will conduct it jointly. The student should secure a minimum of 10 marks for a pass in the *viva voce* examination, failing which he/she shell be required to reappear for the *viva voce* after a month from the date of viva voce already conducted but within a period of 3 months for which he/she will have to pay a fee as prescribed by the Principal.
7. For a pass in this paper as a whole, a student should secure a minimum of 50 marks in Project report and *viva voce* put together.

QUESTION PAPER PATTERN FOR THEORY

Time: 3 Hours Maximum Marks: 75

Each question paper consists of 2 parts – A & B

PART - A (5 x 5 = 25 Marks)

Answer All questions.

Two questions from each unit.

PART - B (5 x 10 = 50 Marks)

Answer All questions.

Two questions from each unit.

QUESTION PAPER PATTERN FOR PRACTICALS

Time: 3 hours Maximum Marks: 60

I. Major practical	-15 Marks
II. Minor practical	-10 Marks
III. Spotters	- 25 Marks
IV. Record	- 10 Marks