

Name of the Department : Department of Zoology, P.U.

Name of the Program: M.Sc. Zoology

Paper No.	Name of Paper	Whether included in Year 2013-14	Whether included in year 2017-18/ 2018-19	Percentage revised in content#	Year of introduction or revision	Remarks (pls, mark value added or skill development paper)	Remarks
1	Zoo-M-101 (Cell Biology)	Yes	Yes as paper CC-2 of Semester I	10%	2015		
2	Zoo-M-102 (Genetics)	Yes	Yes as paper CC-3 of Semester I	20%	2015		
3	Zoo-M-103 (Instrumentation & Biostatistics)	Yes	Yes as paper CC-6 of Semester II	15%	2018	Skill development paper	
4	Zoo-M-104 (Laboratory Coursework)	Yes	Yes as paper CC-4 of Semester II	20%	2015	Skill development paper	
5	Zoo-M-201 (Biochemistry & Histochemistry)	Yes	Yes as paper CC-7 of Semester II	25%	2018		
6	Zoo-M-202 (Vertebrate Endocrinology)	Yes	Yes as paper CC-12 of Semester III	30%	2015	Skill development paper	
7	Zoo-M-203 (Gamete & Development Biology)	Yes	Yes as paper CC-11 of Semester III	20%	2018		
8	Zoo-M-204 (Laboratory Coursework)	Yes	Yes as paper CC-9 of Semester III	45%	2015	Skill development paper	
9	Zoo-M-301 (Population Ecology & Genetics)	Yes	Yes included in CC-5 Semester II	20%	2018		
10	Zoo-M-302 (Vertebrate Immunology)	Yes	Yes included in CC-10 Semester III	20%	2015	Skill development paper	
11.a.	Zoo-M-303 (Cell & Mol. Biology)	Yes	Yes included in EC-1A Semester IV	05%	2018	Skill development paper	
11.b.	Zoo-M-303 (Entomology)	Yes	Yes included in EC-ID Semester IV	25%	2015	Skill development paper	
11.c.	Zoo-M-303 (Fish Biology)	Yes	Yes included in EC-IB Semester IV	30%	2018	Skill development paper	
11.d.	Zoo-M-303 (Parasitology)	Yes	Yes included in EC-IE Semester IV	05%	2015	Skill development paper	
11.e.	Zoo-M-303 (Environmental Biology)	Yes	Yes included in EC-IC Semester IV	25%	2018	Skill development paper	
				50%	2015	Skill development paper	This elective paper was not included in 2012 curriculum

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12	Zoo-M-304 (Laboratory course work)	Yes	Yes included in CC-14 Semester III	60%	2018	Skill development paper	
13	Zoo-M-401 (Animal Behaviour)	Yes	Yes included in CC13 Semester III	50%	2018		
14	Zoo-M-402 (Functional Biology)	Yes	Yes included in EC-ID Semester IV	30%	2015		The contents of this paper have been included in Zoo-M- 201 of Sem II 2015 & CC-1 of Semester I in 2018
15.a	Zoo-M-403 (Cell & Mol. Biology)	Yes	Yes included in EC-1A Semester IV	50%	2018	Skill development paper	
15.b	Zoo-M-403 (Fish & Fisheries)	Yes	Yes included in EC-1B Semester IV	25%	2015	Skill development paper	
15.c	Zoo-M-403 (Environmental Biology)	Yes	Yes included in EC-1C Semester IV	50%	2018	Skill development paper	
15.d	Zoo-M-403 (Entomology)	Yes	Yes included in EC-1D Semester III	20%	2015	Skill development paper	
15.e	Zoo-M-403 (Parasitology)	Yes	Yes included in EC-1E Semester III	10%	2018	Skill development paper	
16	Zoo-M-404 (Cell & Mol. Biology)	Yes	Yes included in EC-2A Semester IV	0%	2015	Skill development paper	
16	Zoo-M-404 (Fish & Fisheries)	Yes	Yes included in EC-2B Semester III	10%	2018	Skill development paper	
16	Zoo-M-404 (Environmental Biology)	Yes	Yes included in IC-2C Semester III	5%	2015	Skill development paper	
16	Zoo-M-404 (Entomology)	Yes	Yes included in EC-2D Semester III	0%	2018	Skill development paper	
16	Zoo-M-404 (Parasitology)	Yes	Yes included in EC-2E Semester III	0%	2015	Skill development paper	

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Name of the Programme : M.Sc. Zoology		Details of the removed content		Details of the added content	
Paper No.	Paper Name & Code				
1	Zoo-M-101 (Cell Biology)				
	Revised in 2015	Unit II. Biology of Chromosome		Unit IV. Translation- Translational proof reading	
	Revised in 2018	Unit I. Different models of replication for linear & Circular DNA		Unit I. Cell movement with respect to Non muscle motility	
		Unit IV. Translation- Translational proof reading			
2	Zoo-M-102 (Genetics)				
	Revised in 2015	Unit III. Cancer Biology		Unit I. Organization of Chromosome	
		Unit IV. Gene Mapping Technique		Unit II. Molecular basis of cellular check points	
				Unit IV. Sex determination, Dosage compensation	
				Unit V. Molecular Techniques in Genetics, DNA profiling, Genome expression Analysis	
	Revised in 2018				
				Unit V. 5.1. DNA Sequencing (Base destruction chain method, termination method, Automated sequencing, Pyrosequencing, whole genome short gun sequencing.	
3	Zoo-M-103 (Instrumentation & Biostatistics)				
	Revised in 2015			Unit I. Ultracentrifuge	
				Unit II. Flow cytometry, Density Gradient Centrifugation.	
				Unit III. Measurement & Scaling Technique.	
	Revised in 2018			Unit I. Photomicrography	
				Unit IV. Rules of Probability for Binomial/ Poission & Normal distribution.	

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Paper N	Paper Name & Code	Details of the removed content	Details of the added content
4	Zoo-M-104 (Laboratory Coursework)		
	Revised in 2015		
		No change	* Working principle of any two instruments
			* Linkage Map Based on data from Drosophila crosses and Tetrad analysis in Neurospora, Pedigree Analysis in Human
	Revised in 2018		
		Working Principle of Any two Instruments	
			* Enumeration of RBC * Enumeration of WBC(TC & DC) * Preparation of Histological slide. * Spotting related to vertebrate & Invertebrate slides
5	Zoo-M-201 (Biochemistry & Histochemistry)		
	Revised in 2015		
		Unit.2 Nature of Enzymes	Unit 1. Glycolysis & Aerobic respiration
		Unit 4 Histology	Unit.III Physiology of respiration
		Unit 5 Histochemical demonstration	Unit.IV Nerve & Muscle Physiology
			Unit.5 Physiology of excretion, thermoregulation
	Revised in 2018		
		Unit .3 Physiology of respiration	Unit 2. Biochemistry of Carbohydrate
		Unit.4 Nerve & Muscle Physiology	Unit 5. Principle of Histology & Histochemistry
		Unit. 5 Physiology of excretion & thermoregulation	

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No.	Paper Name & Code	Details of the removed content	Details of the added content
6	Zoo-M-202 (Vertebrate Endocrinology)		
	Revised in 2015	Unit:5 Physiological effect of Hormones	Unit . 1 Hormones & Messenger Unit: 5 Hormones & Reproduction
	Revised in 2018	No change	Unit . 1 Hypothalamic control of regulation Unit . 2 Hormones involved in reproduction -seasonal breeders, continuous breeders
7	Zoo-M-203 (Gamete & Development Biology)		
	Revised in 2015	Unit:4 Hormones as Mediators of development. Unit:3 Early vertebrate Development	Unit 3. Basic concept of Development Unit. 4 Differentiation: Morphogenesis & organogenesis Unit. 4 Nerve & Muscle Physiology
	Revised in 2018	No change	Unit:5 Nuclear reprogramming of induced Pluripotent stem cell, Test for pluripotency
8	Zoo-M-204 (Laboratory Coursework)		
	Revised in 2015	* Comment upon exposed endocrine gland.	
	Revised in 2018	* Histological preparation, Identification & comment upon spot of Invertebrates, Vertebrate, Embryological slides * preparation of different stages of chick embryo.	* Bio chemical detection of Glucose, starch, Protein or lipid. * Identify and comment upon spots related to evolutionary significance. * Ecological experiments * Biostatistical problem.

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Paper No.	Paper Name & Code	Details of the removed content	Details of the added content
9	Zoo-M-301 (Population Ecology & Genetics)		
	Revised in 2015		
		Unit.5 Population Genetics	Unit. 4 Competition & Niche theory of Mutualism
	Revised in 2018		
		Unit. 3 Predation Models of prey-predator dynamics, Role of Predation in nature, Inter specific and Intra specific competition.	Unit. 4 Global Environmental issues- Climate change, Carbon foot print, Water security, Wild life conservation.
10	Zoo-M-302 (Vertebrate Immunology)		Unit. 5 Emerging Pollutants- POPs, Pharmaceuticals- Bioindicators
	Revised in 2015		
			Unit.1 Humoral immunity-B Cell Activation & differentiation, primary & secondary Humoral response, Cell mediated immunity,-T-Cell development, activation, positive and Negative selection,CTLs and Nk-Cell mediated immunity.
			Unit. 3 Cytokine receptors, BCR
	Revised in 2018		
			Unit. 5 Immune response to infectious Agents-bacterial, viral, immuno deficiency.
			Unit II Antigen Processing and Presentation, MHC complex
11.a.	Zoo-M-303 (Cell & Mol. Biology)		
	Revised in 2015		
		Unit. I Genome organization, sequence organization and repetitive DNA, satellite DNA and its role, DNA reassociation, kinetics, evolution of	Unit 1. Mechanism of attenuation in <i>E.coli</i> and <i>B. Subtilis</i> .
			Unit 4 Cancer Biology, Cytology of cancer cells and types of cancer, Genetic basis of oncogenes and tumor- suppressor gene,chromosomal anomalies associated with cancer.
	Revised in 2018		
			Unit. 3 A. Nucleus B. Cell-cell signaling
			Unit 4. Genomics
			Unit.5 Transposable genetic elements & Epigenetics

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Paper	Paper Name & Code	Details of the removed content	Details of the added content
11.b.	Zoo-M-303 (Entomology) Revised in 2015	Unit. 1 Historical development of classification Unit. 3 Circulatory system- dorsal vessels and accessory pulsatile organ. Unit. 5 Pest of paddy, wheat, sugarcane & stored grain	Unit. 1 classification upto suborders and super families of economically important groups (Coleoptera, Hemiptera & Lepidoptera, Origin of insects Unit 3 Genitalia Unit 5. Insect physiology : Physiology of excretion & Osmoregulation, Haemolymph- composition
	Revised in 2018		Unit 3 A. Insect control & management--Chemical control, Biological control, IPM
			Unit. 4 Reproduction & Development. Male & Female reproductive organ & Types of larvae
			Unit. 5 A. Agricultural Entomology- Pest of paddy, wheat, sugar cane and vegetables, stored grain pest B. Veterinary Entomology C. Forensic Entomology
11.c.	Zoo-M-303 (Fish Biology) Revised in 2015	No change	Unit. 1 Holocephali
	Revised in 2018	No change	Unit 3 Fresh water Aquaculture
			Unit. 4 A. Fish pathology B. Fish Biotechnology
			Unit. 5 A Fisheries resources B. Post Harvest technology
11.d.	Zoo-M-303 (Parasitology) Revised in 2015	No change	Unit. 1 Parasites- ecological aspects, medical implications and control impediments, Niche habitats. Environment and its significance in parasitic life cycle. Vertebrate alimentary canal, blood tissue and other habitats.
	Revised in 2018	No change	Unit 3 Helminthic Parasites: Trematodes & cestodes
			Unit. 4 A. Blood flukes B. Tape worm
			Unit. 5 Host parasite relationship

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11.d.	Zoo-M-303 (Environmental Biology)		
	Revised in 2015		
	Revised in 2018	Remarks : In 2012 Environmental Biology Special paper was not included in M.Sc. Zoology Curriculum of Semester III & IV	
			Unit 1. B Limnology- origin & types of lakes,, Ecological zonation in lakes
			Unit: 2 Stochastic and time lag models of population growth, Lotka volterra equation for competition and predation, functional & Numerical responses.
			Unit: 4 A. Pollution and Environmental Health B. Ecotoxicology
			Unit: 5. A. Environmental monitoring B. Bioremediation & Phyto remediation
12	Zoo-M-304 (Laboratory course work)		
	Revised in 2015		Preparation of slides of bone marrow cells of mice/ rat, Histological slides of lymphoid organ in mice, immunological test for determination of HCG.
	Revised in 2018	No change	
			* Identification & comment upon endocrinological & Embryological slides.
			* Identify & comment upon exposed endocrine glands.
			* Preparation of permanent mount of chick embryo.
13	Zoo-M-401 (Animal Behaviour)	*Histological studies of lymphoid organ in mice, Immunological test for determination of HCG, Determination of Rh blood group using antigen antibody method,Preparation of slides of bone marrow of mice/ rate ,Micrometry, Camralucida, Ecological experiments.	
	Revised in 2015		
		Unit 1. Classical conditioning, Insight learning, Associate learning	Unit 1. Ethology. Definition, Branches & significance. Approach & Methods in the study of behaviour
			Unit 2. Schooling in fish, flocking in birds
			Unit 4. Biological Rhythms- lunar, tidal and epicycles, Migration in fishes.
			Unit 5. Ecological Aspects of Behaviour, habitat selection, optimal foraging theory, Aggressive behaviour
	Revised in 2018		
		No change	Unit 2. Schooling in fish, flocking in birds.

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11. d.	Zoo-M-402 (Functional Biology) Invertebrate & Vertebrate		
This paper of 2012 has been included in Zoo-M-201 (Biochemistry & Physiology) of Semester II in 2015 and CC-1 (Functional Biology of invertebrate & Vertebrate)			
		Revised in 2015	
		No change	Unit 1. Biosystematics in taxonomy, its importance and application in Biology, Hierarchy of categories , species concept, ICZN , Trends in Taxonomy- Chemotaxonomy, Cytotaxonomy & Molecular taxonomy.
			Unit 3. Molecular Evolution-variation in the evolution, origin of new genes and evolution of molecular gene- family
			Unit 4. Mechanism of speciation models of speciation, pattern and mechanism of reproductive isolation.
		Revised in 2018	Unit 5. Population Genetics.
Biosystematics & Evolutionary Biology has been shifted to CC-8 (Biosystematic & Evolution) in semester II without any change.			
13	Zoo-M-403 (Cell & Mol. Biology)		
		Revised in 2015	
		Unit 3 Extra chromosomal genome, Organization of Mitochondria & chloroplast genetic system, Endosymbiosis, Maternal inheritance vs Maternal effects, Molecular basis of cell division.	Unit 3 Genomics -whole genome shot gun sequencing, functional genomics, Genomic organization in Human, Comparative Genomics
		Revised in 2018	Unit 4. Cell to cell signaling.
			Unit 5. Epigenetics - Defention, Molecular basis, mechanism & functnal consequences (All the topics of Zoo-M-403 Cell & Mol. Biology are included inCC-1A of semester IV in 2018)
14	Zoo-M-403 (Fish & Fisheries)		
		Revised in 2015	
		Unit 3 - Whole genome shot gun sequencing	
		Revised in 2018	
		No change	Unit 1. Aquatic weeds & their control.
			Unit 2. Androgenesis, gynogenesis
		Revised in 2018	Unit 3. Collections & Transport of fish seeds from reverine resources. Fish food organisms
			Unit 4. Fish Pathology- Nutritional diseases, intrinsic diseases. Fish Biotechnology- Transgenic fish.

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14	Zoo-M-403 (Environmental Biology) Revised in 2015	No change	
	Revised in 2018		
		No change	
15	Zoo-M-403 (Entomology) Revised in 2015		All topics have been included in ECI C (Environmental Biology) Elective paper of Semester IV in 2018
	Revised in 2018	Unit 5. Medical Entomology- Pest of farm animals & Public Health importance, Attractant, Repellents and antifeedants	Unit 5. Forensic Entomology - Forensically important insects. Collection of data from cadaver site. Interpretation of date Predicting time & cause of death
		No change	Unit V. Veterinary Entomology. (All topics of Zoo-M- 303 Entomology Elective Paper of 3rd semester of 2015 have been added in ECI C Entomology in 2018).
	Revised in 2018	No change	No change
		No change	Unit 5. Host- parasite relationship
15	Zoo-M-404 (Cell & Mol. Biology) Practical Revised in 2015		
	Revised in 2018	No Change	No Change
		* Chromosome Preparation a. Squash preparation of polytene chromosome b. Squash preparation of Meiotic chromosome. C. Flame drying preparation of Metaphasic chromosome	No change

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14	Zoo-M-404 (Fish & Fisheries)		
	Revised in 2015	Estimation of pH using pH meter	No change
	Revised in 2018	No change	Estimation of pH using pH meter. Mounting : Scales, olfactory lamella, respiratory epithelium
15	Zoo-M-404 (Environmental Biology)		
	Revised in 2015		*Qualitative & quantitative estimation of plankton & Benthos, Study of soil fauna by quadrat analysis, Physico-chemical analysis, Estimation of Nitrite, sulphate & Phosphate, Determination of LC 50, Spotting, Dissertation, Class records.
	Revised in 2018	No change	No change
	Revised in 2018	No change	No change
	Revised in 2018	No change	Permanent slide preparation of External genitalia, Spiracles, Gill of aquatic insects.
15	Zoo-M-404 (Parasitology)		
	Revised in 2015	No Change	Dissertation included
	Revised in 2018	No change	Comment upon etiology of Parasite obtained from rectum of frog, alimentary canal of fowl, Rumen of goat.