A.V.V.M. SRI PUSHPAM COLLEGE (AUTONOMOUS), POONDI

Programme: M. Sc.
Department: Zoology

Syllabus Revision 2017-2018

S.No.	Courses	Number of courses having changes
1.	Core Course	06
2.	Elective Course	-
	TOTAL	06

Total Number of Courses : 23

Total Number of Courses having changes : 06

Percentage of Revision : 26.1 %

Note:

The content of the syllabus which has been revised is highlighted.

M.Sc., ZOOLOGY (2017 – 2018)

S. No	SEM	Category	Paper Code	Title of the Paper	Maximum Marks			Minimum Marks for Pass			Hours Week	Credits
					CIA	E.E	Total	CIA.	E.E	Total		
1.	I	Core	17P1ZOC1	Biology of Invertebrates and Chordates	25	75	100	10	30	50	6	5
2.		Core	17P1ZOC2	Cell and Molecular Biology and Biophysics	25	75	100	10	30	50	6	5
3.		Core	17P1ZOC3	Microbiology	25	75	100	10	30	50	6	4
4.		Core	17P1ZOCP1	Practical I ((Invertebrate and Chordate, Cell and Molecular Biology and Microbiology)	40	60	100	16	24	50	6	4
5.		Major Elective-I	17P1ZOEL1A 17P1ZOEL1B	General and Human Genetics Genomicsl and Proteomics	25	75	100	10	30	50	6	4
6.	II	Core	17P2ZOC4	Developmental Biology and Bio-Techniques	25	75	100	10	30	50	5	5
7.		Core	17P2ZOC5	Environmental Biology and Conservation	25	75	100	10	30	50	5	4
8.		Core	17P2ZOC6	Biotechnology	25	75	100	10	30	50	5	4
9.		Core	17P2ZOC7	Endocrinology	25	75	100	10	30	50	4	4
10		Core PL	17P2ZOCP2	Practical II (Developmental Biology, Bio-Techniques, Biotechnology &Environmental Biology)	40	60	100	16	24	50	6	4
11		Major Elective	17P2ZOEL2A 17P2ZOEL2B	Cell and Tissue culture Wild Life Management	25	75	100	10	30	50	5	4
12	III	Core	17P3ZOC8	Immunology	25	75	100	10	30	50	5	4
13		Core	17P3ZOC9	Animal Physiology and Bio-Chemistry	25	75	100	10	30	50	5	5
14		Core	17P3ZOC10	Clinical Biochemistry	25	75	100	10	30	50	5	4
15		Core	17P3ZOC11	Nanotechnology	25	75	100	10	30	50	4	4
16		Core	17P3ZOCP3	Practical-III (Animal Physiology, Biochemistry, Immunology and Clinical Biochemistry)	40	60	100	16	24	50	6	4
17		EDC	17P3ZOEDC	EDC - Clinical Lab Technology	25	75	100	10	30	50	4	---
			Communicative skill and Personality development								1	---
18	IV	Core	17P4ZOC12	General and Applied Entomology	25	75	100	10	30	50	6	5
19		Core	17P4ZOC13	Research Methodology	25	75	100	10	30	50	6	4
20		Core	17P4ZOCP4	Practical-IV (General and Applied Entomology and Research Methodology	40	60	100	16	24	50	6	3
21		Major Elective	17P4ZOEL3A 17P4ZOEL3B	Estuarine Biology & Aquaculture Fisheries Science	25	75	100	10	30	50	6	4
			Communicative skill and Personality development		-	-	-	-	-	-	1	-
22		CN	17P4ZOCN	Comprehension	-	100	100	---	---	50	5	2
23		Project	17P4ZOPR	Project	40	60	100	16	24	50		4
				Total			**2300**				**120**	**90**

M.Sc., ZOOLOGY SYLLABUS

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	17P1ZOC1	Core – BIOLOGY OF INVERTEBRATES AND CHORDATES	6	5

Objectives:

1. To understand the morphology and functional anatomy of both invertebrates and chordates in a comparative aspects.
2. To know the biological aspects of minor phyla in detailed way.
3. To study the types of fossils and their phylogenic relationship with higher group of animals.
4. To study the external features inner anatomical features in a comparative manner with Chordate animals.
5. To study the evolution of chordate species.

Unit I **Hrs 18**

Important human parasites and vectors. Life cycle and biology of plasmodium, Wuchereria, Schistosoma and Leishmania, vectors of human diseases – Mosquitos, flies, ticks. Cellular and physiological basis of host- parasite interaction.

Unit II **Hrs18**

Locomotion in Protozoa, skeleton system in Porifera, Polymorphism and metagenesis in cnidaria, parasitic adaptations in helminthes, coelom and metamerism in annelids, Larvae of crustaceans, Respiration in Arthropods(Prawn, Cockroach, Scorpion) Torsion in Mollusca and larval forms in Echinoderms.

Unit III **Hrs18**

General organization and phylogeny of Rotifera, Chaetognatha, Ectoprocta – Entoprocta, Phoronida. Study of Invertebrate fossils – Trilobites, ammonoids, Living fossils- Peripatus, Limulus, Nautilus, Vertebrate fossil – Archaepteryx – Sphenodon.

Unit IV **Hrs18**

Comparative study of digestive, respiratory, circulatory and urinogenital system of Invertebrates and Chordates (Earthworm, Cockroach, Freshwater Mussel, Frog, Calotes and Rabbit).

Unit V **Hrs 18**

Parental care in fishes and amphibians – Mesozoic Reptiles - Migration of birds – Primitive mammals – Monotrems and Marsupials.

Reference:

1. Ekambaranathan ayyar, 1993 – Out line of Zoology – Vol -I & II, S.Viswanathan (Printers & Publication) Pvt. Ltd, Chennai.
2. Hyman, L.H. The invertebrates, Vol 3 to 6 – Mc Graw Hill Book Co., London.
3. Kotpal, R.L. Minor Phyla, Rastogi Publishers, Meerut.
4. Kotpal, R.L. Phyla Series, Rastogi Publishers, Meerut.
5. Mooe, R.C. Lallicker and A.G. Fisher (1952) “” Invertebrate Paleontology”. Mc Graw Hill book Co., New York.
6. Woods, H. (1961) Paleontology – Invertebrata Combridge University Press
7. Hyman L.H. (1967) Compaative Vertebrate anatomy. Mc Graw Hill BookCo. New Delhi
8. Parker and Haswell (1967), Text Book of Zoology Vol-I and Col-II.
9. Newmann, W.H. (1961) Phylum Chordate. The University of Chicago Press. Chicago.
10. Romer, A.S (1960) Vertebrate Paleontology, University of Chicago Press, Chicago.
11. Yong, J.Z. (1962) The life of vertebrates, Oxford University Press. London.
12. Colbert, E.H. (1970) Evoluton of vertebrates. John Wiley and Sons, New York.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	17P2ZOC5	Core - ENVIRONMENTAL BIOLOGY AND CONSERVATION	5	4

Objectives:

1. To know the ecosystems of terrestrial and water in a comparative manner.
2. To study the various Biotic community and Biodiversity. To know the survey of natural resources and conservation and management.
3. To study the Air pollution, various pollutants – effects of ozone – green house effect and Noise pollution.
4. To know the water resources and its management. To study various water pollution and prevention an control of water pollution.
5. To study the radiation ecology – space ecology – Exobiology – hazards of space travel.

Unit I **Hrs 18**

Dynamic aspects of Ecosystems, comparative study of ecosystems: Terrestrial, forest, grassland, salt marsh, crop land and Aquatic ecosystems, food chain –food web. Ecological pyramids – primary and secondary production – energy flow – ecological niche.

Unit II **Hrs 18**

Biotic community – organization and characteristics of community Biodiversity - importance of biodiversity – dominance, Ecotone and Edge effect -community Stratification – succession.

Survey of natural resources –conservation of natural area and biota – Soil conservation of biosphere reserve. Environmental quality standard. Wild life conservation-conservation of forest. Fisheries management –Convention on international Trade of endangered species (CITES).

Unit III **Hrs 18**

Population ecology – characteristics of population, population growth curve, regulation of population ; concept of metapopulation – demes and dispersal – interdemic extinctions, age structured population, species interaction – Types of interactions, inter specific, Intra specific interactions.

Unit IV **Hrs 18**

Air Pollution: Environmental effects ozone, depletion – Green house effect – Global warming – Noise pollution. Water resources and its management – Water pollution – sources and effects – industrial pollution – with reference to paper mills, Pesticides – Indicator organisms – Bioaccumulation and Bio-monitoring of pollutants – Prevention and control of pollution.

Unit V **Hrs 18**

Radiation Ecology – comparative radio sensitivity, Remote sensing, and Radio – Telemetry as tools for ecological research – Space ecology – Exobiology – hazards of space travel, Water shed management and Rain water harvesting.

Reference:

1. Dowd swell, W.H. An introduction to Animal Ecology, Melthuen, London.
2. Odum, E.P. 1953. Fundaments of Ecology. W.B. Saunders, Philadelphia.
3. Mellarnby, K., The Biology of Pollution.
4. Dash, M.C. Fundamental of Ecology

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	17P2ZOC6	Core - BIO-TECHNOLOGY	5	4

Objectives:

1. To study the concept and scope of Biotechnology and techniques in Biotechnology.
2. To understand the recombination DNA technology.
3. To aware the programs of cell culture, preparations hormones and vaccines, engineered Hb, transgenic animals and Human genome project.
4. To study the Bio process Technology and their application.

Unit I **Hrs 18**

Concepts and scope of Biotechnology – Gene cloning – the basic steps – various types of restriction enzymes – ligase – linkers and adapters – cDNA – transformation – Selection of recombinants. Gene probe – Molecular finger printing (DNA finger printing) – RFLP – the PCR techniques – Genomic library – Blotting techniques – Southern blotting – Northern blotting – Western bloting.

Unit II **Hrs 18**

Plasmid biology – cloning vector based on E.coli, PBR322 and bacteriophage. Cloning vector for yeast. Cloning vector for Agro bacterium tumefaciens. Cloning vector for mammalin cells – Simian virus 40 – Gene transfer technologies.

Unit III **Hrs 18**

Cell culture – Organ culture – Whole embryo culture- Embryo transfer – In vitro fertilization (IVF) technology – Dolly – embryo transfer in human. Transgenic animal. Human gene therapy – Cryobiology.

Unit IV **Hrs 18**

Bioprocess and applications – Survey and uses of enzymes in industries – Isolation and purification of enzymes – Enzyme Immobilization techniques – Fermenters, their design and types – Down stream processing – Recovery of Fermented products; Commercial production of single cell protein (SCP) – Primary metabolites – Ethanol, Vitamins ;Secondary Metaolites – Penicillin.

Unit V **Hrs 18**

Bioremediation – bioremediation of hydrocarbons – industrial wastes – Heavy metals- Xenobiotics – bioleaching – biomining – biofuels. Applications of biotechnology in agriculture, medicine and food science. Genetically modified micro organism (GMO'S) – Regulations in Biotechnology - Biosafety – Contaminents and IPR.

Reference:

1. Dubey, R.C.-A text Book of Biotechnology, S. Chand and Co., Ltd., New Delhi. 1996.
2. Gupta, P.K. – Biotechnology and genomic, Restage Publications, Meerut 2004.
3. Rebert F. Weaver – Molecular Biology II Edn., Tata McGraw-Hill, New Delhi.
4. D. Balasubramanian et al – Concepts in Biotechnology – Concepts in Biotechnology – Concepts in Biotechnology.
5. Link, E.R. and Pastenak – J.J. Molecular biotechnology.
6. Putohit, S.S. –Biotechnology Fundamentals and Application-Agrobios, Jothpur-2005.
7. Alberghina – Protein Engg. In Industrial Biotechnology – New Era Books, Bangalore,
8. Eun – Enzymology primer for recombinant DNA Technology, Glazer-Microbial Biotechnology.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	17P2ZOC7	Core - ENDOCRINOLOGY	4	4

Objectives:

1. To make the students to learn the objectives and scope of comparative Endocrinology.
2. To know the anatomy, morphology and histology of endocrine tissues of vertebrates, crustacean and insect endocrine organs and their functions.

UNIT-I:Introduction to endocrinology **Hrs18**

Introduction, objectives and scope of endocrinology - modern concepts and problems in Endocrinology - Experimental methods of hormone research - general classes of chemical messengers.

UNIT-II: Pituitary and thyroid glands **Hrs18**

Pituitary gland - characteristics, structural organization - hormone secretion and its functions - Hypothalamic control.

Thyroid gland - structural organizations, metabolic effects of thryroid - effects on reproduction - parathyroid and its structure and functions.

UNIT-III: Pancreas and adrenal glands **Hrs18**

Structure of pancreas, pancreatic hormones and their functions.

Structural organizations of adrenals, functions of cortical and medullary hormones.

UNIT-IV: Insects and crustacean endocrinology **Hrs18**

Concepts of neurosecretions - endocrine systems in crustaceans - endocrine control of moulting and metamorphosis - neuroendocrine system in insects - endocrine control of moulting - metamorphosis and reproduction.

UNIT-V: Veratebrate reproductive endocrinology **Hrs18**

Structure of mammalian testis and ovary - male and female sex accessory organs - hormones of testis and ovary - estrous and menstrual cycle - hormones of pregnancy - parturition - hormonal control of lactation. Hormonal control of metamorphosis in an anuran amphibian.

Reference

1. Haris, G.W. and B.T. Donovan. 1968. The Pituitory Gland. S. Chand and Co.,
2. Bentley, P.J. 1985. Comparative vertebrate endocrinology, Second Edition, Cambridge University Press. Cambridge.
3. Mac Hadley. 1992. Endocrinology, 3rd Edition. Prentice - Hall Inc. A Simon & Schuster Company, Englewood Cliffs, New Jersey. USA.
4. Ingleton, P.M. and J.T. Bangara. 1986. Fundamentals of comparative vertebrate endocrinology, Kluwer Academic Publishers.
5. Turner, C.D. and J.T. Bangara. 1986. General endocrinology. Saunders

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**17P3ZOC10**	**Core -CLINICAL BIO-CHEMISTRY**	**5**	**4**

Objectives:

1. To study the lab setup and safety measures
2. To learn about the metabolic disorders
3. To study about the disorders of kidney and liver
4. To know about the hormonal imbalances.

UNIT I: LABORATORY SETUP AND SAFETY **Hrs 18**

Requirements of setting up of clinical laboratory, SI units in clinical laboratory, Collection preparation, preservation, and handling of clinical samples, quality control, Safety measures in clinical laboratory. Formulation of clinical and diagnostic kits, Safety aspects

UNIT II METABOLIC DISORDERS **Hrs 18**

Disorders of Carbohydrate Metabolism – Diabetes mellitus, glucose and galactose tolerance tests, sugar levels in blood, renal threshold for glucose, factors influencing blood glucose level, glycogen storage diseases, pentosuria, galactosemia.

Disorders of Lipid metabolism – Plasma lipoproteins, cholesterol, triglycerides & phospholipids in health and disease, hyperlipidemia, hyperlipoproteinemia, Gaucher's disease, Tay-Sach's and Niemann-Pick disease, ketone bodies, Abetalipoproteinemia.

UNIT III **Hrs 18**

NEUROLOGICAL AND PSYCHIATRIC DISORDERS: Symptoms, diagnosis and treatment of Schizophrenia, Alzeimer's disease, Wernicke-Korsakoff syndrome, dementia, Wilson's disease, antipsychotic drugs – anti depressants.

Ageing- Physiological and biochemical changes in ageing. Different theories of ageing, importance of superoxide dismutase in ageing, plasticity and regeneration

UNIT IV **Hrs 18**

Disorders of liver and kidney – Jaundice, fatty liver, normal and abnormal functions of liver and kidney. Inulin and urea clearance. Digestive diseases – Maldigestion, malabsorption, creatorrhoea, diarrhoea and steatorrhoea- Electrolytes and acid-base balance – Regulation of electrolyte content of body fluids and maintenance of pH. Disorders of acid-base balance and their respiratory and renal mechanisms

UNIT V **Hrs 18**

Inborn errors of Metabolism- Disorders of amino acid metabolism – Phenylalanaemia, homocystinuria, tyrosinemia; Disorders of nucleic acid metabolism- Disorders in purine/pyrimidine metabolism

Infact of Hormonal imbalances: GH, TSH, ACTH, FSH, LH, Testoteran, Oestrogen.

Reference:

1. Burger, A., Med. Chem.
2. Wilson and Gisvold, Organic Med. Pharmaceutical Chem.
3. Ariens, Drug Design, Academic press, NY,1975.
4.Allan Gen, Clinical Biochemistry, 1995.
5. John W. Baynes. Med H.Dominick, Medical Biochemistry, 2005.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	17P3ZOC11	Core – NANOTECHNOLOGY	4	4

Objectives:

1. To know about the Nanotechnology.
2. To learn about the nanoparticles and targeted drug delivery.
3. To learn the improved diagnostic products and techniques.
4. To study about the applications of nanomaterials.

UNIT – I

Principles of Nanobiotechnology; Introduction to nanotechnology - History of nanotechnology – Fundamental concept of Nanotechnology – Scope and application of Nanotechnology.

UNIT – II

Nanomaterials - classification of nanomaterials - properties of nanomaterials – Preparation of Nanomaterials – Synthesis of nanomaterials.

UNIT – III

Synthesis of nanoparticles. Using natural sources – nanotubes, carbon nanotubes, Formation of carbon nanotubes – uses of nanotubes – Biological applications of nano tubes.

UNIT – IV

Measuremant techniques for nanomaterials – x-ray crystallography – Atomic force microscope – Electron microscope – SEM, TEM – Flouresence microscope.

UNIT – V

Applications of nanomaterials – Present and future nanoparticles in medicine – Introduction of drug delivery in pharmaceutics. Nanoparticles carrier and their carrier characteristics.

Reference:

1.Claupdio Nicolini, Nanobiotechnology & Nanobiosciences Pan Stanford Publishing Pte. Ltd.2009.
2.O.Skoseyov, Ilan levy, Nanobiotechnology – BioInspired Devices and Materials of the Future, Humana Press Inc, 2008.
3.N.Yao and Zhong Lin Wang, Handbook of Microscopy for Nanotechnology Kluwer Academic Publishers, 2005.
4.Nanotechnology – N.Arumugam – Saras Publications.
5.Indroduction to Nanotechnology – Neal lane and James .R. Heath.