

**DEPARTMENT OF ZOOLOGY
PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011**



Syllabus for

**M.Phil Zoology Programme under
Choice Based Credit System (CBCS)
With effect from the academic year 2013-2014 onwards**

DEGREE OF MASTER OF PHILOSOPHY (M.PHIL) IN ZOOLOGY

RULES AND REGULATIONS FOR ADMITTING THE Students for FULL-TIME / PART TIME M.Phil Programme.

The following are the rules and regulation for admitting candidates in **M.Phil., (Zoology)** programme in Periyar University, Salem from the Academic Year 2013 – 14 and thereafter.

Eligibility:

Candidates who have qualified for post graduate degree in Zoology / Animal Science/ Animal Biotechnology/Wild Life Biology/ integrated course in Biology/ Life Sciences/ Advanced Zoology of this University or any other University recognized by the Syndicate as equivalent thereto shall be eligible to register for the Degree of Master of Philosophy (M.Phil) in the respective subject and undergo the prescribed course of study in an approved institution or department of this University. Candidates who have qualified for their postgraduate degree on or after the respective postgraduate degree to become eligible to register for the Degree of Master of Philosophy (M.Phil) in Zoology and undergo the prescribed course of study in the University Department.

For the candidates, who seek admission into M.Phil., course shall have obtained a minimum of 55% marks in his/her Master's Degree. However, for the candidates belonging to SC/ST community and those who have qualified for the Master's degree before 01.01.1991 the minimum eligibility marks shall be 50% in their Master's Degree.

Duration:

The duration of the M.Phil., course shall be over a period of **One Year** from the commencement of the course in each academic year.

Course of Study:

The course of study of the degree shall consist of (a) Part-I comprising three Theory papers according to the Syllabus prescribed by the board of studies. Of which the third paper should be the Elective paper(s). The Elective paper syllabus is related to the expertise of the concern faculty and (b) Part-II Dissertation and *viva voce*.

Course Scheme and Scheme of Examinations for M.Phil (Zoology) with effect from 2013-2014 onwards.

Subject Code	Title of the Paper	Internal Mark /25	External Mark /75	Total Marks /100
First Semester				
13MPZ01	Research Methodology	25	75	100
13MPZ02	Transgenic Animal Technology	25	75	100
13MPZE01	Elective Papers <ul style="list-style-type: none"> • Cancer Nanomedicine • Animal Behaviour and Bat Ecology • Regenerative Medicine • Insect Physiology • Vermicology • Vector Biology 	25	75	100
Second Semester				
13MPZD01	Dissertation and <i>viva voce</i>	100	50+50 I+E	200

Credits allotted to the theory papers and project.

Part – I

Research Methodology : 4 Credits

Transgenic Animal Technology : 4 Credits

Elective Paper : 4 Credits

Part– II

Dissertation and *viva-voce* : 12 Credits
(Dissertation: 8 Credits and *viva-voce*: 4 Credits)

Viva-Voce will be conducted with the following members

H.O.D – Member of the Viva Examination

Guide – Chairman of the Viva Examination

External examiner from other University from the related area – Member of the Board of Valuation

Double valuation procedure will be adopted for **Dissertation**, one by the respective guide and the other by the external examiner, preferably by the *viva-voce* examiner.

Scheme of Examinations:

Part-I Theory Examination: (Three Theory Papers)

The examination of theory papers and Dissertation shall be held at the end of the year as per the examination procedures with the concurrence of Head of the Department. The duration for each paper shall be 3 hours carrying a maximum of 100 marks for theory papers and 200 marks is allotted for Dissertation and *viva voce*.

The examiners will be appointed from the panel of four names of each papers submitted by the Departments concerned. If the awarded total mark varies more than 10% between the Internal and External examiners, the paper will be valued by a third examiner whose award of marks will be final.

Part-II-Dissertation and *viva voce*

The exact title of the Dissertation shall be intimated within one month after the completion of the Theory paper examination. Candidates shall submit the Dissertation to the University through the Supervisor and Head of the Department at the end of the academic year from the commencement of the course, which shall be valued by internal examiner (Supervisor) and one external examiner appointed by the University from a panel of four names sent by the supervisor through the Head of the Department.

The examiners who value the Dissertation shall report on the merit of candidates as “Highly Commended” (75% and above) or “Commended” (50% and above and below 75%) or “Not Commended” (below 50%).

If one examiner commends the Dissertation and the other examiner, does not commend, the Dissertation will be referred to a third examiner and the third valuation shall be final. Submission or resubmission of the Dissertation will be allowed twice a year.

Passing Minimum:

A candidate shall be declared to have passed part-I of the examination if he/she secured not less than 50% of the marks in each paper including paper-III for which examination is conducted internally.

A candidate shall be declared as pass in the Dissertation *viva voce* examination if his/her dissertation is at least commended.

All other candidates shall be declared to be failed in the examination.

Restriction in number of chances:

No candidate shall be permitted to reappear for the written examination in any paper on more than two occasions or to resubmit a Dissertation not more than two times. Candidates shall have to qualify for the degree passing all the written papers and dissertation within a period of three years from the date of commencement of the course.

Conferment of Degree:

No candidate shall be eligible for conferment of the M.Phil. Degree in Zoology unless he/she is declared to be passed both in the Theory papers and Dissertation and *viva voce* of the examination as per the Regulations.

PART-TIME**Eligibility:**

- Teacher / Researchers/ candidates working in the University/college/school/research organization recognized by the State/ Central Government sectors and that should be approved by the concern authority of this university.
- Teacher candidates working in the affiliated colleges and whose qualifications are approved by the University.
- Teacher candidates working in polytechnics approved by the Director of Technical Education or in Higher Secondary Schools and High Schools approved by the State Board or Central Board of Secondary Education or Educational Institutions of IAF (within Periyar University jurisdiction) who possess a Master's Degree. For the Master's Degree qualified prior to 01.01.1991, no minimum marks is prescribed; but on or after 01.01.1991, a minimum of 55% of the marks is prescribed, provided that for the candidates belonging to SC/ST community a concession of 5% marks will be given in the minimum eligibility marks prescribed.

Duration:

The course of study shall extend over a period of two years from the commencement of the course. The examination for part-I shall be taken at the end of the first year and part-II Dissertation at the end of the second year.

Course of Study:

The Regulations governing the full-time M.Phil., course with regard to course of study, scheme of examination passing minimum, etc and qualifications of guide conducting the M.Phil., course shall apply to part-time candidates also.

Restriction in number of chances:

No candidate shall be permitted to reappear for the written examination in any paper on more than two occasions or to resubmit a Dissertation more than twice. Candidates shall have to qualify for the degree passing all the written papers and dissertation within a period of four years from the date of commencement of the course.

PERIYAR UNIVERSITY, SALEM – 636 011
DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I THEORY PAPER – I

RESEARCH METHODOLOGY

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT I: PREPARATION OF THESIS/ DISSERTATION: Basic concepts of research: Method of writing Dissertation : Preparation of Abstract, Collecting information for Introduction and definition of the research problems- Collection of data for Historical resume, Development and standardization of materials and methods with specific objectives of research problem, Interpretation of data and results. Method and strategy of discussing your results. Tactics of Summarize the results.

(15 hours)

Unit-II: RESEARCH IS A NEVER ENDING PROCESS. Defining and formulation of research problem- literature collection using internet and journals- way of interpretation of references cited in the Thesis/ dissertation. Development of research proposal- Origin of proposal Construction of Research hypothesis- and their types: null and alternate hypothesis and testing of hypothesis- theory, principles, law and concepts. Data collection technique. Selection of problem- stages in execution of research; preparation of Manuscript for journals.

(15 hours)

UNIT III: DESCRIPTIVE STATISTICS: Collection of data, Variables and observations, empirical distribution, bar chart, stems and leaf, histogram. Mean, Median, Mode formula and applications; Dispersion: range, variance, standard variance, standard deviation, inter-quartile range; Shape: modality, skewness. Probability: probability distributions- Bernoulli, binomial, Poisson, normal. Hypothesis – Formulation – Testing of Hypothesis – Normal, Binomial Poisson, t-test, χ^2 and F distribution, Multiple Correlation- simple Linear regression, Linear additive model- Anova.

(15 hours)

UNIT IV: COMPARISON OF MEANS AND MULTIVARIATE ANALYSIS: Testing significance: confidence interval- sample mean. Use of statistical tables and levels of significance. Analysis of variance: ANOVA and MANOVA. Tukey's, Dunnett's, SNK. Simple

correlation and regression analysis; Chi-square test, students' t-test. Multivariate analysis: basic principles and application. Use of correlation and regression, regression and correlation coefficients. Multivariate Analysis: Basic principles and applications of Multiple regression analysis, Principal Component Analysis (PCA), Discriminant Function Analysis (DFA), Cluster Analysis

(15 hours)

UNIT V: BIOINSTRUMENTATIONS: Principle, structural components of instrument, method and applications of pH meter, UV-Visible spectrophotometer, IR spectrophotometer, NMR and Types, X-ray diffraction, Mass Spectrophotometer, MALDI, SELDI and MS-MS, GC-MS, HPLC, GLC and Different types of Microscopes used in Biological Sciences.

(15 hours)

REFERENCE BOOKS:

1. Davis, GB and CA Parker. 1997. Writing the doctoral dissertation. Barrons Educational series, 2nd Edition.
2. Kannan, S. M. Krishnan, R.Thirumurugan and S.Achiraman. 2012. Methods in Molecular Biology – From Cell to Molecules. First Edition, UVN- Press. India
3. Duncary P. 2003. Authoring a Ph.D thesis: How to plan, draft, write and finish a doctoral dissertation. Palgrave Macmillan.
4. Snedecor GW and WG Cochran. 1978. Statistical methods. Oxford and IBH publishing Co Pvt. Ltd.
5. Daniel WW. 2006. Biostatistics: A Foundation for Analysis in the Health Sciences (7thedn). JohnWiley& Sons, New York.
6. Zar, Jerrold H. 2008. Biostatistical Analysis (3rdedn.). Pearson Education Inc., New Delhi.

Subject Code: 13MPZ02

PERIYAR UNIVERSITY, SALEM – 636 011

DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I THEORY PAPER – II

TRANSGENIC ANIMAL TECHNOLOGY

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT I : ANIMAL CELL CULTURE: Stages of culturing - cell culture media, cell lines, large scale culture, bioreactor models for animal cell culture, characterization and maintenance of cell lines – telomerase and cellular aging. Cryopreservation, cell bank. Applications of cell line. Gene transfer into animal cells, expression of foreign genes in animal cell lines.

(15 hours)

UNIT II VIRAL VECTORS – Biology, adenovirus, adeno associated virus, retroviral vectors, Herpes virus, vaccinia virus. Stem cells – Definition, functions and origin, types, stem cell therapy, stem cell culture and applications. Impact of Oncolytic viruses in Cancer Treatment. Human Genome Project and its perspectives. Ethical issues in Animal Biotechnology.

(15 hours)

UNIT III : MOLECULAR PEST MANAGEMENT – pest management using juvenile hormone analogues. Pheromones in genetic manipulations – Biotechnology of silk worms. Baculo viruses in biocontrol and foreign gene expression – Biotechnology in aquaculture – transgenic fishes. Animal bioreactor and molecular farming. Selected traits and their breeding into livestock. Applications of molecular genetics in improvement of livestock. Influence of Vitellogenin and its receptor in insect pest management.

(15 hours)

UNIT IV : CLONING AND RECOMBINANT PRODUCTS Cloned genes and production of recombinant proteins and vaccines. Insulin, somatotrophin, somatostatin, β -endorphin, Human interferons. Hepatitis B virus vaccine, vaccine for foot and mouth disease virus – DNA vaccine. Development of RNAi to target various diseases like diabetes and cancer.

(15 Hours)

UNIT V TRANSGENIC ANIMALS – mice, cattle, Gene knockout mice. Use of nucleic acid probes and antibodies in clinical diagnosis. DNA fingerprinting. Current trends in Gene therapy. Ethical issues in Animal Biotechnology. Current scenario of Next generation Sequencing and its application in biology. Recent achievements in DNA/ Protein Microarray and Biochip technology

(15 hours)

Reference Books

1. S.Kannan, M.Krishnan, R.Thirumurugan and S.Achiraman. 2012. Methods in Molecular Biology – From Cell to Molecules. First Edition, UVN- Press. India.
2. Butler, M., 2003. Animal Cell Technology: Principles and Products, Open University Press, New York.
3. Winnacker, E.L., 2005. From Genes to Clones: Introduction to Gene Technology, VCH Publications, Germany.
4. Epplen, J.T., and Lubjuhn, T., 2004. DNA Profiling and DNA Fingerprinting, Birkhauser Verlag, Basel.
5. Gupta, P.K, 2012, Biotechnology and Genomics, Rastogi Publications, Meerut, India.
6. Marx, J.L., 2007. A Revolution in Biotechnology, Cambridge University Press, Cambridge.
7. Mather, J.P. and Barnes, D., 2008., Methods in Cell Biology, Vol 57 Animal Cell Culture Methods, Academic Press, New York.
8. Potten, C.S, 2006. Stem Cells, Academic Press, London.
9. Flickinger, M.C. and Drew, S.W., 2003. Encyclopedia of Bioprocess Technology: Fermentation, Biocatalysis and Bioseparation, Vol. I to V, John Wiley and Sons Publications, New york..
10. Strachan, T. and Read, A.P., 2006. Human Molecular Genetics, John Wiley & Sons, Pvt., Ltd., Singapore.

Subject Code: 13MPZE01

**PERIYAR UNIVERSITY, SALEM – 636 011
DEPARTMENT OF ZOOLOGY**

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I ELECTIVE PAPER – I

CANCER NANOMEDICINE

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT-I : CELL CULTURE TECHNIQUE: Preparation of media and chemicals for cultivation of cancer cells- preparation of antibiotics for culture maintenance- Primary and secondary cell culture- Gene transfer into cancer cells. Microscopic techniques staining to test the cell viability, cytotoxicity, cancer progression, DNA damage and over expression of oncogenes at protein level. Applications of PCR in cancer studies. Kinetics of Cancer cell growth,. Cell culture based vaccines. Cancer proteomics and Genomics

(15 Hours)

UNIT-II: GENETIC BASIS OF CANCER: Oncogene and their types- Tumour suppressor genes and their mode of action-Molecular mechanism of oncogenesis. Role of gene mutation in cancer induction. Apoptosis and their classification. Role of anti-apoptosis in cancer suppression. Impact of p53, Retinoblastoma, E2F3, cPLA2 and COX-2 in cancer studies. Current scenario of RNAi and Nanomedicine technology in tumour treatment and drug development.

(15 Hours)

UNIT –II: CELL SIGNALLING IN CANCER : Cell lines MCF-7, HeLa, HepG2, A549 and ZR771. Signaling at the cell surface, Types of signaling pathways that control gene activity, Etiology, epidemiology, diagnosis and treatment of Breast, Lung, colo-rectal, blood, endocrine cancers. Role of gene therapy in cancer treatment. Significance of cancer stem cells.

(15 Hours)

UNIT – IV: SYNTHESIS AND CHARACTERIZATION OF NANOPARTICLES- UV-Visible Spectroscopy, IR spectroscopy, X-RD analysis and charge determination using Zeta analyser. Biomodification and surface alteration in nanoparticles- Biocompatibility, bioaccumulation and controlled release properties of nano conjugates and nanocarrier.

(15 Hours)

UNIT-V: CURRENT SCENARIO OF NANOMEDICINE: Nanoparticle as drug carriers- Nanoparticles as gene carrier- Nanoparticle as RNAi carriers. Development of nanomedicine to target cancer. Commercialized nanocarriers for cancer treatment. Impact of nano in Cancer biology.

(15 Hours)

REFERENCE BOOKS

1. Albert B. et al., 2008. Essential Cell Biology, Garland Publishing, Inc. New York.
2. Lewin, B. 2009. Genes XI, Oxford University Press, Oxford
3. Brown, T.A. 2009. Genomes, John Wiley and Sons, Pvt. Ltd., Singapore
4. Wilson, Keith, Walker, John, 2010. Principles and Technique of Biochemistry and Molecular Biology, Cambridge University, London
5. David J. Lockwood, FRSC: Introduction to Nanoscale Science and Technology, 2004. National Research Council of Canada Ottawa, Ontario, Canada.
6. Augus I Kirkland and John L Hutchison: Nanocharacterisation, 2007. Department of Materials, Oxford University, Oxford, UK.
7. Yury Gogotsi: Nanomaterials Handbook, 2006. Taylor & Francis Group, Boca Raton, London

Subject Code: 13MPZE01

PERIYAR UNIVERSITY, SALEM – 636 011
DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I ELECTIVE PAPER – I

ANIMAL BEHAVIOR & BAT ECOLOGY
(For those admitted in June 2013-2014 and later)

Contact hours per week:05

Contact hours per semester:75

4 CREDITS

SYLLABUS

Unit I: FUNDAMENTALS OF ETHOLOGY: Introduction- Founding fathers of animal behaviour - Innate and acquired behaviour - Proximate and ultimate causation of behaviour - Animal learning – Trial and error learning - Classical and operant conditioning.

(15 Hours)

Unit II: BREEDING AND FORAGING BEHAVIOR: Breeding behaviour – Monogamy - Polygamy - Polyandry – Resource defence polygyny - Female defence polygyny - Advantages of roosting together - Parental care-Foraging behaviour – Types of foraging – Group and solitary foraging – Factors affecting foraging - Resource sharing - Partitioning of resources – Eavesdropping

(15 Hours)

Unit III: CHRONOBIOLOGY: Introduction- Different types of biological rhythm- Ultradian, Circadian and Infradian rhythms- Zeitgebers, Free running and entrainment of rhythms- Animals with varying circadian rhythms- Role of Pineal gland and Melatonin in Circadian rhythm- Body temperature rhythm. Neural basis of biological clock and role of suprachiasmatic nuclei. Sleep-wakefulness cycle. Time keeping genes. problems and treatments for Jet-lag and shift work

(15 Hours)

Unit IV: COLLECTION AND IDENTIFICATION OF BATS:Classification of bats and their identification – Collection methods of bats - Mist netting - hoop netting - Tuttle traps – Methods of marking bats - Non invasive methods of identification of bats - Methods to study the abundance of bats. Echolocation and its uses- Classification based on echolocation- Classification based on food types - Bat roosting areas - Beneficial role of bats – Pollination - seed dispersal - insect control - Diseases spread by bats

(15 Hours)

Unit V MOLECULAR ECOLOGY:Molecular ecology and phylogeography – DNA markers – DNA fingerprinting - Minisatellites - Microsatellite - Mitochondrial DNA - PCR – RAPD – RFLP

(15 Hours)

REFERENCE BOOKS

1. Alcock, J. 2013. *Animal Behavior: An evolutionary approach*. Sinauer Associates, Inc
2. Chandrashekar, M.K. 2006. *Time in the living world*. University Press (India) Ltd.
3. Dytham, C. 1999. *Choosing and Using Statistics: A Biologist's Guide*. Oxford: Blackwell Scientific.
4. Kunz, T.H. & B. Fenton. 2000. *Bat ecology*. Pp.798, University of Chicago Press.
5. Martin, P. & Bateson, P. 1999. *Measuring Behaviour: An Introductory Guide*. 2nd edn. Cambridge: Cambridge University Press.
6. Rowe, G., Beebe, T. 2008. *An introduction to Molecular Ecology*. Oxford University Press.

Subject Code: 13MPZE01

PERIYAR UNIVERSITY, SALEM – 636 011
DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY
SEMESTER – I ELECTIVE PAPER – I

REGENERATIVE MEDICINE

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT-I: PRIMARY CULTURE AND ESTABLISHED CELL LINES- History of animal cell culture, cell culture media and reagents, culture of mammalian cells, primary culture and secondary cell lines, continuous cell lines, suspension cultures, somatic cell cloning and hybridization.

(15 Hours)

UNIT-II: GENE CLONING- Cloning vectors- plasmids, expression vectors viral, baculo and yeast vectors. Construction of genomic and cDNA library, Transcript analysis, Study and Regulation of gene expression.

(15 Hours)

UNIT-III: CELLULAR REPROGRAMMING- Transfection and transformation of cells, application of animal cell culture for *in vitro* testing of drugs and toxicity assay, Cell proliferation, ageing of cell, induced pluripotent stem cells, cellular reprogramming.

(15 Hours)

UNIT-IV: EPIGENETIC REGULATION- Disease modelling and drug screening in pathogenic bacteria, epigenetics of reprogramming, immunocytochemical analysis, gene promoter methylation of pluripotent stem cells, gene knock out and gene silencing using siRNA and ShRNA for genetic disorders.

(15 Hours)

UNIT-V: COMMERCIALIZATION OF BIOTECHNOLOGY- iPS cells to elucidation of pathogenesis, drug discovery, toxicology study, and cell transplantation therapy in the future.

(15 Hours)

REFERENCE BOOKS

1. Gordon I. 2005. Reproductive Techniques in Farm Animals. CABI.
2. Portner R. 2007. Animal Cell Biotechnology. Humana Press.
3. Twyman RM. 2003. Advanced Molecular Biology. Bios Scientific Publication
4. Ausubel FM, Brent R, Kingston RE, Moore DD, Seidman JG, Smith JA & Struhl K. 2002.
5. Benjamin Lewin, 2011. Genes XI Jones and Bartlett Publishers.

6. Mather, J.P. and Barnes, D. 2008. *Methods in Cell Biology, Vol 57 Animal Cell Culture Methods*, Academic Press, New York.

Subject Code: 13MPZE01

PERIYAR UNIVERSITY, SALEM – 636 011

DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I ELECTIVE PAPER – I

VECTOR BIOLOGY

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

4 CREDITS

SYLLABUS

UNIT 1: AN OVERVIEW OF VECTORS: Classification of Vectors. Biological and Mechanical vector and their adaptations and pest management. External morphology of Insects – Types of mouthparts, Antennae, wings and legs. Life cycle of Housefly – Types of metamorphosis in insects.

(15 Hours)

UNIT 2: INTRODUCTION TO VECTORS – Vector Biology, Insect vectors. Types of vectors, Human vectors and Animal vectors. Vector borne diseases – Insect transmitted diseases.

(15 Hours)

UNIT 3: INTRODUCTION TO MOSQUITOES - Mosquito life cycle. Mosquito feeding behavior. Anopheles, Aedes and Culex. Sand flies, Bugs – Human bugs, lice & fleas.

(15 Hours)

UNIT 4: MALARIA – Parasites, causes, symptoms, diagnostics and treatment. Plasmodium life cycle. Dengue & Filariasis - causes, symptoms, diagnostics and treatment. Blue tongue virus, sleeping sickness.

(15 Hours)

UNIT 5: SYNTHETIC DRUGS – Treatment of malaria, filariasis & Dengue. Biological treatment for Dengue. Nano-drug delivery system. Vector control – Integrated vector control program. Chemical, Physical and Botanical control. Synthesis of Metal Nanoparticles for insect vector control.

(15 Hours)

REFERENCE BOOKS

1. Mike Service, 2008. Medical Entomology for Students. Cambridge University Press, R. F. Chapman, 1998. The *Insects*: Structure and Function. Cambridge University Press.
2. Isaac Ishaaya, Subba Reddy Palli, A. Rami Horowitz, 2012. Advanced Technologies for Managing Insect Pests. Springer.
3. B.F. Eldridge, J.D. Edman, 2003. Medical Entomology: A Textbook on Public Health and Veterinary Problems Caused by Arthropods. Springer.
4. Chapman, M. W. Service, Hall 1993. Mosquito Ecology: Field Sampling Methods. Chapman & Hall publishers.
5. Arun Kumar; Heidi M. Mansour; Adam Friedman; Eric R. Blough 2013. Nanomedicine in Drug Delivery. CRC Press.
6. B. K. Tyagi, 2008. Vector-borne diseases: epidemiology and control. Scientific Publishers.

Subject Code: 13MPZE01

PERIYAR UNIVERSITY, SALEM – 636 011

DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I ELECTIVE PAPER – I

VERMICOLOGY

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

4 CREDITS

SYLLABUS

Unit-I EARTHWORMS – Taxonomic position and diversity. Types – morphological and ecological grouping – Epigeic, Anecic and Endogeic species. Ecological role and economic importance of earthworms – Need for earthworm culture.

(15 Hours)

Unit-II VERMICULTURE – Scope and application. Common species for culture – Environmental requirements. Culture methods – Wormery – Breeding techniques. Indoor and outdoor cultures – Monoculture and Polyculture – Relative merits and demerits.

(15 Hours)

Unit III APPLICATIONS OF VERMICULTURE – Vermicomposting – Use of Vermicastings in Organic farming/Plantation/Agricultural Crops & Horticulture, Earthworms for management of municipal organic solid wastes – as feed/bait for capture/culture fisheries. Nutrient value of worm cast/vermicompost, Quality Control – Effect of vermicompost on plants.

(15 Hours)

Unit IV VERMICULTURE PRODUCTS: Marketing the products of vermiculture – Socio-Economic value of Vermiculture – Creating the demand by awareness and demonstration, advertisements, packaging and transport, direct marketing.

(15 Hours)

Unit-V FUTURE PERSPECTIVES – Predator/pathogen control in Wormeries. Role of Farmers/NGO's in promoting Vermiculture/Vermicompost in India.

(15 Hours)

REFERENCE BOOKS

1. Edwards, C.A. Arancon, N.Q. and Sherman, R. 2011. Vermiculture Technology: Earthworms, Organic Wastes, and Environmental Management. CRC Press, Boca Raton, FL.
2. Ismail, S.A. 1997. Vermicology: The Biology of Earthworms. 1st Edition, Orient Longman, India.
3. Ismail, S.A. 2005. The Earthworm Book. Second Edition, Other India Press, Apusa, Goa, India.
4. Ranganathan, L.S. 2006. Vermibiotechnology – From Soil Health to Human Health. Agrobios, India.

Subject Code: 13MPZE01

PERIYAR UNIVERSITY, SALEM – 636 011

DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – I ELECTIVE PAPER – I

INSECT PHYSIOLOGY

(For those admitted in June 2013-2014 and later)

Contact hours per week: 05

Contact hours per semester: 75

UNIT: I CLASSIFICATION OF INSECTS- external morphology, types of mouth parts, antenna, legs and wings.

(15 Hours)

UNIT: II SYSTEM PHYSIOLOGY: anatomy, physiology and biochemistry of digestive system, respiratory system, circulatory system, excretory and reproductive systems.

(15 Hours)

UNIT: III NEURO-ENDOCRINE PHYSIOLOGY OF INSECTS - hormones and behaviors and pheromones and behavior. Embryonic development: formation of the embryo - stages of embryonic development, parthenogenesis - polyembryony - viviparity and oviparity.

(15 Hours)

UNIT: IV PHYSIOLOGY OF METAMORPHOSIS: Types with examples- complete metamorphosis and incomplete metamorphosis, physiological development of various organs. Physiology of sense organs.

(15 Hours)

UNIT: V BENEFICIAL AND HARMFUL INSECTS: Insects pest of agriculture (Rice, cotton and groundnut), Sericulture, Apiculture and Lac culture.

(15 Hours)

REFERENCE BOOKS

1. Tembore, D. B. 2002. Modern Entomology, Himalaya publishing house. India
2. Howard E. Evans. 2000. Insect Biology: A Textbook of Entomology. Wiley publishing company. Reading, MA
3. Vasantharaj David, B. and T. Kumaraswami. 1994. Elements of economic entomology. Popular Book Depot. Jaipur, India.
4. Chapman, R.F. 2012. The insects: structure and functions. Cambridge University press. UK.
5. Mark J. Klowden. 2007. Physiological Systems in Insects, Academic press. New York.
6. Richards, O.W. and Davies, R.G. 1994. Imms' General Textbook of Entomology: Volume 1: Structure, Physiology and Development Volume 2: Classification and Biology. Springer. India.
7. David, B.V. and T.N. Ananthkrishnan, 2004. General and Applied Entomology. TATA McGraw Hill Publishing house. Delhi.

Subject Code: 13MPZD01

PERIYAR UNIVERSITY, SALEM – 636 011
DEPARTMENT OF ZOOLOGY

M.Phil. DEGREE COURSE IN ZOOLOGY

SEMESTER – II

DISSERTATION AND VIVA VOCE
(For those admitted in June 2013-2014 and later)
12 CREDITS

RULES GOVERNING THE EVALUATION OF DISSERTATION AND VIVA VOCE

1. Each student shall select a topic for his/her research work in consultation with his/her guide and Head of the Department. The Dissertation report should be submitted to the Controller of Examinations through the Head of the Department on or before 30th July of every year or the date prescribed by the Controller of Examinations with the approval of the Head of the Institution. If a candidate fails to submit the Dissertation on the date prescribed by the Controller of Examinations he/she may be permitted to submit the same one day prior to the date of *viva voce* examination with a fine prescribed by the Controller of Examinations in consultation with the Head of the institution at that time.
2. Each student shall submit 4 copies of his/her project report for valuation. The project report shall contain atleast 50 pages excluding bibliography and appendices. This condition may be relaxed in the case of the students who have chosen a research problem for their dissertation on the recommendation of the guide.
3. The project shall be valued for a total of 150 marks out of which the external examiner and the guide share 75 mark each. The sum of marks awarded by both the examiners shall be considered to be the final mark. For a pass in the project work, the student should secure a minimum of 38 marks. If the student fails to get the minimum pass marks in the Dissertation, he/she shall be permitted to resubmit his/her Dissertation once again within a period of 6 months after the publication of the result.
4. For those candidates who have passed in the evaluation of Dissertation, there will be a *viva voce* examination on the above. The *viva voce* carries a maximum of 50 marks and it will be conducted jointly by the guide and the external examiner or Head of the Department. The student should secure a minimum of 25 marks for the pass in the *viva voce* examination failing which he/she shall be required to reappear for the *viva voce* same after a month but within a period of three months for which he/she will have to pay a fee as prescribed by the Head of the Institution.

Further for a pass in this paper as a whole, a student should secure at least 100 marks in Project report and *viva voce* put together.

QUESTION PAPER PATTERN

Time : 3 Hours

Maximum marks : 75

SECTION – A

(5X 5= 25 marks)

Answer ALL Questions

Five questions with either or type. Each answer should not exceed 400 words.

SECTION – B

50 marks

Answer ALL Questions

Five questions with either or type. Each answer should not exceed 700 words.

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