
JAYARAJ ANNAPACKIAM COLLEGE FOR WOMEN (AUTONOMOUS)

A Unit of the Sisters of St. Anne of Tiruchirappalli

Accredited with 'A' Grade (3rd Cycle) by NAAC

DST - FIST Supported College Since 2015

(Affiliated to Mother Teresa Women's University, Kodaikanal)

PERIYAKULAM – 625 601, THENI DT.

TAMIL NADU.



M. PHIL. ZOOLOGY 2017 - 2020

M. PHIL ZOOLOGY
PROGRAMME OUTCOMES - M. PHIL

PO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO
1	Reflect critically on their own, with their peers' and synthetic working situations in the light of new concepts and course input.
2	Identify relevant sources, evaluate them and to use these appropriately in their studies.
3	Engage in independent study and group/pair work including the presentation of materials.
4	Relate skills with self management and task achievement, meeting deadlines, problem-solving and metacognitive awareness.
5	Associate study skill with data collection and researching, digesting, selecting, planning, writing and presenting articles for publication.
6	Present reports on their findings in the respective category of work to improve their expertise and imbibe practical abilities.

PROGRAMME SPECIFIC OUTCOMES - M. PHIL

PSO. NO.	UPON COMPLETION OF THIS PROGRAMME THE STUDENTS WILL BE ABLE TO	PO MAPPED
PSO - 1	Examine critically, synthesize and evaluate ideas across a broad range of modern zoology and survey earlier research outcomes and relate their own research problem.	PO - 1 PO - 6
PSO - 2	Demonstrate the ability and skill to design experiment, formulate hypothesis, Compute biological data, analyse and interpret the concept exploiting the MS software, SPSS package, and other data analytical packages.	PO - 2 PO - 4 PO - 6
PSO - 3	Describe the principles, working mechanisms and applications of various Instruments used in research and operate them efficiently.	PO - 5
PSO - 4	Utilize the integral application of knowledge and techniques in recent advances in zoology for human and social welfare.	PO - 6
PSO - 5	Share, communicate scholarly and publish the research outcomes and findings orally and verbally and build their reputation among their peers.	PO - 6 PO - 3

M. PHIL. COURSE PATTERN (2017-2020)

Sem.	Code	Title of the paper	Hours	Credits
I	17MZO1C01	Research Methodology	10	8
	17MZO1C02	Recent Advances in Zoology	14	12
	17MZO1E3A	In-depth Study	6	-
		Total	30	20
	17MZO2E3A	In-depth Study	-	5
II	17MZO2R01	Project		15
		Total for I & II Semesters	30	40

CIA COMPONENTS FOR IN-DEPTH STUDY

Components		Marks
*Mid Semester	:	30
*End Semester	:	30
Attending Seminars (International/National) (Component I)	:	5
Paper Presentation in Seminars/Conferences (Component II)	:	15
Paper to be submitted in any International/National Research article format to the concerned guide (Component III)	:	15
Attendance (Component IV)	:	5
Total	:	100

* Mid Semester and End Semester examinations will be conducted in the I Semester and assessment in the II Semester.

* **Question Paper for Test will be set and valued by the Research advisor only**

Submission of M.Phil. Dissertation will be on 31st July.

Paper I - RESEARCH METHODOLOGY

Semester: I

Hours: 10

Code : 17MZO1C01

Credits: 8

COURSE OUTCOMES:

- ❖ Acquire knowledge on collection of literature, citation, research report and experimental design.
- ❖ Describe the working principles and applications of various instruments used in research laboratories.
- ❖ Develop skill in immunological techniques.
- ❖ Handle biological data effectively for project and research work.
- ❖ Compute and analyse data using Biostatistical software.

UNIT I

- 1:1 Literature Collection – Need for review of literature, Review process and bibliography, Searching – Pub - med literature through internet, Research reading, Discriminative reading, Consulting source material, Working bibliography, Index cards and reference cards.
- 1:2 Literature citations – Different systems of citing references, Name year system, sequence system, Alphabet – number system, journal abbreviations.
- 1:3 Research report – Components of a research report, plagiarism, tables, figures, formatting and typing.
- 1:4 Experimental Designs – Basic principles of experiments. **(30 Hours)**

UNIT II

- 2:1 Principle of micro techniques – Fixatives and histological stains, Fixation, Tissue processing and staining, Freeze etching microtomy.
- 2:2 Principle and applications of Electron microscopy – Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) , Scanning and Transmission Electron Microscope (STEM).
- 2:3 Principle and applications of Chromatography – Paper, Column, Ion exchange, High Pressure Liquid Chromatography (HPLC), Thin Layer Chromatography (TLC) and Gas Liquid Chromatography (GLC).
- 2:4 Principle and applications of Electrophoresis – Paper, Agar Gel, Poly Acrylamide Gel Electrophoresis (PAGE), Sodium Dodecyl Sulphate Poly Acrylamide Gel Electrophoresis (SDS-PAGE), Temperature Gradient Gel Electrophoresis (TGGE). **(30 Hours)**

UNIT III

- 3:1 Principle and applications of P^H meter, Centrifuge , Calorimetry , Wet combustion, Bomb calorimeter, Warburg's apparatus, Oxygen analyser.
- 3:2 Principle and applications of Spectrophotometry, Colorimeter, Verification of Beer – Lambert's law, UV - Vis spectrophotometer, UV Atomic absorption spectrophotometer, Flame photometer.
- 3:3 Immunological Techniques of antigen and antibody interactions – Agglutination, Precipitation, Radio immuno assay, Enzyme Linked Immuno Sorbant Assay (ELISA),Immuno electrophoresis, Western blotting, Immno precipitation, Immuno fluorescence,
- 3:4 Principle and applications - Autoradiography, Radiation measuring devices – Geiger MullerCounter, scintillation counter. **(30 Hours)**

UNIT IV

- 4:1 Population sampling in biological studies, Variables, Sampling methods, Types of biological data, Nominalscale, ordinal scale, Interval scale and Ratio scale. Methods in filed Biology -Methods of estimating population density of animals and plants ranging patterns through direct. Indirect and remote observations, sampling methods in the study of behaviour, habitat characterization ground and remote sensing methods.
- 4:2 Probability – Theorems of probability, Terminology, Probability distribution - Binomial, Normal and Poisson.
- 4:3 Analysis of differences – Observation of null and alternate hypothesis, Students t test, F test, ANOVA, Types of error, Parametric and Nonparametric tests.
- 4:4 Analysis of association – Chi - square test, Correlation and Regression. **(30 Hours)**

UNIT V

- 5:1 Windows objects, Malware - viruses and worms. MS word – Window layout, File menu, Edit, Menu, View,Menu,Format menu, Tools menu, Table menu.
- 5:2 MS Excel – Window layout, working with work sheet, Functions, Charts, Maps and graphs, analyzing the data with Excel.
- 5:3 MS Power Point – Window layout, Slide, Creating a presentation using Auto content Wizard, Using templates, Using Blank presentation, Transition effects, Animation effects.

BOOKS FOR REFERENCE:

1. De Robertis E.D.P., (1988). Cell and Molecular Biology. International Edition, 8th edition, M. Varghese Company, Bombay.
2. Aggarwal Y.P., (1988). Statistical Methods. 2nd edition, Sterling Publishers Private Limited, New Delhi.
3. Keith Wilson and John Walker., (1995). Practical Biochemistry. 4th edition, Cambridge University Press, Cambridge.
4. Verma P.S., Agarwal V.K., (1978). Cytology. 1st edition, S. Chand and Company Ltd, New Delhi.
5. Veerakumari L., (2006). Bio Instrumentation. MJP Publishers, Chennai.
6. Rodney F Boyer., (2009). Modern Experimental Biochemistry. 3rd edition, Published by Darling Kindersley (India), Pvt., Ltd, South Asia.
7. Bailey N.T.J., (1997). Statistical Method in Biology. 3rd edition, Cambridge University Press, New York.
8. Anderson N Durston., (1970). Thesis and Assignment Writing. Polle Wiley Eastern Limited.
9. Kothari C.R., (2004). Research Methodology. 2nd edition, New Age International Publishers, New Delhi.
10. Parsons C.J. George Allen., (1973). Thesis and Project work Guide to Research and Writing. Unwin Ltd, London.
11. Gurumani N., (2006). Research Methodology. MJP Publishers, Chennai.
12. Gurumani N., (2005). An Introduction to Biostatistics, MJP Publishers, Chennai.
13. Downie N.M., Robert Heath W., (1983). Basic Statistical Methods. 5th edition, Harper and Row, Publishers, Inc, New York.
14. <http://www.springerlink.com>.
15. <http://www.sciencedirect.com>

Paper II - RECENT ADVANCES IN ZOOLOGY

Semester: I

Hours: 14

Code : 17MZO1C02

Credits: 12

COURSE OUTCOMES:

- ❖ Think and evolve strategies for management and conservation of environment for sustaining life.
- ❖ Explain the fine structure and advanced molecular aspects of genetic material.
- ❖ Understand the role of Bio techniques in human health and well being.
- ❖ Appraise the knowledge of immune system.
- ❖ Recognize the role of the nanotechnology in the assurance of quality health care

UNIT I

- 1:1 Environmental pollution (air, water and soil) – Causes and remedies, Environmental Impact Assessment, Environmental laws, Risk assessment.
- 1:2 Environmental education, Bioremediation, Phytoremediation, Biomagnification, Biofertilizers, Biopesticides, Biomonitoring, Biosensors.
- 1:3 Renewable and non renewable sources of energy, conventional and nonconventional - Solar energy, Bio fuels, Nuclear energy, Biomass, Bio energy.
- 1:4 Biodiversity – Types, Measures of diversity, Conservation, Loss, Barcoding. Remote sensing and radio telemetry in Ecological research. **(42 Hours)**

UNIT II

- 2:1 DNA sequencing and human genome project, DNA finger printing and its application, DNA amplification and PCR, Gene library, Micro arrays – DNA, Protein and Nanoarray.
- 2:2 Detection of genetic diseases using DNA recombinant technology, Screening and counselling, Human gene therapy.
- 2:3 Cloning techniques and its application in biology – Ethical issues. Stem cell research and its applications.
- 2:4 Reproductive technology – Assisted Reproductive Technology (ART) - Ethical, Legal and Social implications. **(42 Hours)**

UNIT III

- 3:1 Somatic mutation and oncogenes - Induction of mutation by mutagens, teratogens and carcinogens.
- 3:2 Methods involved in the production of transgenic plants and animals and their uses, Molecular approaches to diagnosis and strain identification, Production of recombinant insulin and growth hormone.
- 3:3 Protein engineering, Enzyme technology, Terminator genes.
- 3:4 Drug discoveries - Pharmacogenomics, Nanotech surgery, Implants, Nanomedicine. **(42 Hours)**

UNIT IV

- 4:1 Vaccine - Whole organism vaccines, subunit vaccines, RNA vaccines, edible vaccines, recombinant vaccines, DNA vaccines, synthetic peptide vaccines, purified macromolecules as vaccine, multivalent subunit vaccines, development of vaccines for AIDS.
- 4:2 Monoclonal Antibodies and Hybridoma technology, Antibody engineering.
- 4:3 Microbial fermentation and production of macro and micro molecules.
- 4:4 Bioprocess, Downstream processing, Microbial mining. **(42 Hours)**

UNIT V

- 5:1 Application of nanotechnology in life science – Cell biochip, Imaging techniques.
- 5:2 Electro spinners, Bio nanofabrics (silk cotton, spider cotton and milk cotton).
- 5:3 Nano technology in Environment – Environmental regulation of Nanotechnology, Pollution prevention technology – sensing methods, Nanoscale materials, Environmental and energy technology.
- 5:4 Nanotechnology in Agriculture – Micro fluidics, Micro electromechanical systems, Bioanalytic nano sensors, Bio selective surfaces, Nanotechnology in the food market and food industry, Veterinary applications. **(42 Hours)**

BOOKS FOR REFERENCE:

1. Richard A.Goldsby., Thomas J. Kindt and Barbara A Osborne., (2000). Kuby Immunology. 4th edition, W.H. Freeman and Company, New York.
2. Norio Taniguchi., (2008). Nanotechnology. Integrated Processing Systems for Ultra Precision and Ultra Fine Products, Indian edition, Oxford University Press.
3. Lakshman Desai., (2007). Nanotechnology. Paragon International Publishers, New Delhi.
4. Kumar U., (2008). Nanotechnology (A fundamental Approach). Agrobios (India), Jodhpur.
5. Mathur S.K., (1994). Fundamentals of Biotechnology. Second enlarged edition, Agor
6. botanical publishers (India).
7. Ramadass P., (2008). Animal Biotechnology (Recent concepts and developments). MJP Publishers, Chennai.
8. Mukhopadhyay S.N., (2001). Process Biotechnology Fundamentals. Viva Books Private Limited, New Delhi.
9. Hans-Peter Schmauder .,(1997). Methods in Biotechnology. Taylor and Francess Publishers.
10. Jayandra kumar Johri., (2009). Recent Advances in Biopesticides (Biotechnological Applications). New India Publishing Agency, New Delhi.
11. Lynn E. Foster., (2008). Nanotechnology. Science, Innovation and Opportunity. Pushp Print services.
12. Somnath Dutta., (2009). Medicinal Microbiology. Adhyayan Publishers and distributors,New Delhi.
13. Arthur M. Lesk., (2007). Introduction to Bioinformatics. 2nd edition, Oxford University press.
14. Arvind Goyal., (2009). Global Warming and Preventive Measures. Navying Publishers and Distributors, New Delhi.
15. Gladis Helen Hepsyba S and Hemalatha C.R., (2009). Basic Bioinformatics. MJP 16.
16. Ghosh S.B.,(2009). Scientific Approach to Environment. Ritu Publications, Jaipur, India.
17. Paul N. Cheremisinoff and Robert O.Ouellette., (1985). Biotechnology Applications and Research. Technomic Publishing Co., INC.
18. Park K., (2000). Textbook of Preventive and Social Medicine. 16th edition, M/s Banarsidas Bhanof Publishers, Jabalpur, India.
19. Oser B.L., (1977). Hawk's Physiological Chemistry. Tata McGraw Hill publishing Co., Ltd, New Delhi.
20. Khan T.I. Shushodia., (1998). Biodiversity Conservation and Sustainable Development.
21. Pointer Publishers, Jaipur.
22. Mishra P.C. *et al.* (1995). Advances in Ecology and Environmental Sciences. Ashish Publishing House, New Delhi.
23. Talwar G.P. (1983). Handbook of Practical Immunology.Vikas Publishing House Pvt. Ltd, New Delhi.
24. Tewari J.P., Lakhanpal T.N., Jegjit Singh., Rajini Gupta., Chamola B.P., (1999). Advances in Microbial Biotechnology. A.P.H. Publishing Corporation, New Delhi.

IN-DEPTH STUDY

(Internal only)

Semester: II

Hours: 6

Code : 17MZO1E3A

Credits: 5

COURSE OUTCOMES:

- ❖ Make links across different areas of knowledge.
- ❖ Generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- ❖ Gain a thorough knowledge applicable to the chosen field, understand and apply the techniques.
- ❖ Identify and define emerging problems.
- ❖ Acquire flexibility to accommodate new knowledge and perspectives.

Ten latest research articles relevant to the project has to be studies, revised and reported by the student under the concerned project supervisor.

Components:

Marks: 100

A. Mid semester Test *	25
B. End Semester Text *	25
C. Two Reviews	2 x10=20
D. Attending seminars (National/International)	5
E. Presentation of papers in Seminars/Conferences/(Certificate must be produced)	10
F. Paper Publication in Journals (Evidence should be given)	10
Research article format for publication to be submitted in the month of June	
G. Attendance	5
Total	100

* Question Paper for Test will be set and valued by the Research advisor only

Submission of M. Phil., Dissertation will be on 31st July.

PROJECT

Semester: II

Credits: 15

Code : 17MZO2R01

COURSE OUTCOMES:

- ❖ Choose to specialize in a particular field in Biology.
- ❖ Apply laboratory techniques and mastery of basic laboratory skills in inter disciplinary fields of Biology.
- ❖ Master the art of critical thinking, associated cognitive skills in the formulation of a problem, data gathering and analysis and interpretation of results to address practical questions in Biology.
- ❖ Present ideas clearly and coherently to specific audience in both written and oral forms.
- ❖ Acquire the skills to communicate effectively.