



MAHENDRA ARTS & SCIENCE COLLEGE

(Autonomous)

Affiliated to Periyar University, Salem.

Accredited by NAAC with 'A' Grade & Recognized u/s 2(f) and 12(B) of the UGC Act 1956

Kalippatti – 637 501, Namakkal (Dt), Tamil Nadu

3.4.1

**The Institution ensures implementation of its stated
Code of Ethics for research**

**Certificate of the Head of the Institution for
the copy of the syllabus of the research
methodology course work to indicate the
research ethics**



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Dr.S.Arjunan
Principal

02/09/2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that research ethics topic is included in the research methodology course work syllabus of M.Phil., & Ph.D. programs. The research ethics topics are highlighted and enclosed for your kind reference.


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Kalippatti (PO) - 637 501, Namakkal (Dt)



PERIYAR UNIVERSITY

SALEM - 636 011, TAMILNADU

NAAC "A" Grade - State University - NIRF RANK 83 - ATAL RANK 4

Dr. K. Thangavel
Registrar (PAC)

PU/P/R&D/RPE course work/2021

Date: 30.03.2021

To

1. The Principals of Colleges affiliated to Periyar University
2. The Heads of Department, Periyar University
3. All the research Centers affiliated to Periyar University.

Sir/Madam,

Sub: Periyar University - Ph.D Research Programme - Course Work - Research
Publication and Ethics (RPE) - implementation - intimation - Reg.

Ref: 1) UGC letter No. D.O.No.F.1-1/2018 (Journal/CARE), December 2019
2) Vice chancellor order dated on 29.03.2021

I am by direction to inform that a new course work entitled Research and Publication Ethics (RPE) is to be included under Part - A for all the Ph.D candidates admitted from July 2020 session with reference to the letter cited in ref (1).

In this regard, the syllabus with other details for the above course is enclosed. The same may be informed to all supervisors and research scholars.

K. Thangavel 31.3.21
Registrar (PAC)

Encl: As above.

Copy to:

The controller of examinations, Periyar University - For information.

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ANNEXURE

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course

Course Code: CPE- RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
Total		30

Syllabus in detail

THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 - Introduction to philosophy: definition, nature and scope, concept, branches
 - Ethics: definition, moral philosophy, nature of moral judgements and reactions
- RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 - Ethics with respect to science and research
 - Intellectual honesty and research integrity
 - Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 - Redundant publications: duplicate and overlapping publications, salami slicing
 - Selective reporting and misrepresentation of data
- RPE 03: PUBLICATION ETHICS (7 hrs.)**
 - Publication ethics: definition, introduction and importance
 - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 - Conflicts of interest
 - Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 - Violation of publication ethics, authorship and contributorship
 - Identification of publication misconduct, complaints and appeals
 - Predatory publishers and journals

PRACTICE

- RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**


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1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

• **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

Use of plagiarism software like Turnitin, Urkund and other open source software tools

• **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

References

- Bird, A. (2006). *Philosophy of Science*. Routledge.
- MacIntyre, Alasdair (1967) *A Short History of Ethics*. London.
- P. Chaddah. (2018) *Ethics in Competitive Research: Do not get scooped; do not get plagiarized*. ISBN:978-9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being a Scientist. A Guide to Responsible Conduct in Research. Third Edition*. National Academics Press.
- Resnik, D. B. (2011). What is ethics in research & why is it important. *National Institute of Environmental Health Sciences*, 1-10. Retrieved from <https://www.niehs.nih.gov/research/resources/bioethics/wharis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. *Nature*, 489(7415), 179-179. <https://doi.org/10.1038/489179a>
- Indian National Science Academy (INSA), *Ethics in Science Education, Research and Governance*(2019). ISBN:978-81-939482-1-7. http://www.insaIndia.res.in/pdf/Ethics_Book.pdf



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Salem - 636 011

Tamilnadu, India

DEPARTMENT OF BIOTECHNOLOGY

REGULATIONS AND SYLLABUS

MASTER OF PHILOSOPHY IN BIOTECHNOLOGY

(Outcome Based Education in M.Phil - Biotechnology)

(Under CBCS for University Department)

2018 - 19 Onwards

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DEPARTMENT OF BIOTECHNOLOGY
PERIYAR UNIVERSITY, SALEM- 11
M.Phil Biotechnology
(Curriculum Details-2018-2019)

I – Semester		Credits
MPBT01	Research Methodology	4
MPBT02	Plant and Animal Biotechnology	4
MPBT03	Guide Paper	4
II – Semester		
	Dissertation	8
	Viva-Voce	4
		24

Preamble

This curriculum framework for the M.Phil. program in Biotechnology is developed keeping in view of the student centric learning pedagogy, which is entirely outcome-oriented and curiosity-driven. The curriculum framework focuses on pragmatist approach whereby practical application of theoretical concepts is taught with substantial coverage of practical and field based studies. The platform aims at equipping the graduates with necessary scientific skills for biotechnology related careers, in Research, Industry and higher education sectors. Also this framework are master graduates may attribute critical thinking, scientific reasoning, moral ethical reasoning qualification descriptors that are specific outcomes pertinent to the discipline. While designing these frameworks, emphasis is given on the objectively measurable teaching-learning outcomes to ensure employability of the graduates. The pragmatic core of the framework has been designed such a way to enable the learners implementing the concepts to address the real-world problems. Above all, this framework is aimed to mould responsible Indian citizen who have adequate knowledge and skills in reflective thinking, rational skepticism, scientific temper, digital literacy.

Aims

- ❖ To transform curriculum into outcome-oriented scenario.
- ❖ To develop the curriculum for fostering discovery-learning.
- ❖ To equip the students in solving the practical problems pertinent to India.
- ❖ To adopt recent pedagogical trends in education including e-learning, and MOOCs.
- ❖ To mold responsible citizen for nation-building and transforming the country towards the future.



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OBE Regulations and Syllabus

Vision

- ❖ Periyar University aims towards excellence in education, research, promoting invention, innovation and preserving culture identity for future generation.

Mission

- ❖ Provide a vibrant learning environment, fostering innovation and creativity inspired by cutting edge research.
- ❖ Aspire to be a national leader in developing educated contributors, career ready learners and global citizens.
- ❖ Provide well equipped facilities for teaching, research, administration and student life.
- ❖ Have well defined autonomous governance structure.
- ❖ To make a significant, consistent and sustainable contribution towards social, culture and economic life in Tamil Nadu, India.

Values

- ❖ Motivation of students to be responsible citizens making them aware of their societal role.
- ❖ Inculcate scientific temper, honesty, integrity, transparency, empathy, and ethical values amidst student.
- ❖ Impact a desire for lifelong learning to foster patriotic sensibility, accountability and holistic well being.
- ❖ Provide conducive and cosmopolitan environment for innovation and free thinking.
- ❖ Imbibe value-based education leading to inclusive growth.

Department Vision

The Department of Biotechnology was established in 2008, has offering quality M.Sc. M.Phil and Ph.D programmes in Biotechnology. These programmes have been designed to produce biotechnologists who can address the challenges and needs of the country and the world at large. We aim to become a leading centre of education, research and entrepreneurship in Biotechnology, guided by sound scientific and ethical principles.

Mission

- ❖ Provide a vibrant learning environment, fostering innovation and creativity inspired by cutting edge research.
- ❖ Aspire to be a national leader in developing educated contributors, career ready learners and global citizens.
- ❖ Provide well equipped facilities for teaching, research, administration and student life
- ❖ Have well defined autonomous governance structure.
- ❖ To make a significant, consistent and sustainable contribution towards social, culture and economic life in Tamil Nadu, India.



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Program Educational Objectives

- ❖ Competent in applying theoretical and practical hands on approach in Biotechnology.
- ❖ To apply the knowledge in providing solution to health, environmental and research problems.
- ❖ Promote Innovation and Research in cutting edge biotechnological research.
- ❖ To address the problems faced by India and to become a responsible citizen.
- ❖ Promote a strong sense of team spirit and brotherhood for building a strong India.

Program Outcomes / Program Learning Outcome (Department Vision)

The graduates of Biotechnology student must have:

- ❖ **PO1** Ability to approach, analyze and bring out scientific solution for a given problem.
- ❖ **PO2** Knowledge to implement multidisciplinary concepts and ideas for the development of innovative technologies.
- ❖ **PO3** Demonstrate technical skills in operation and maintenance of sophisticated instrumentations.
- ❖ **PO4** Capability to bring out high quality research publications as well as protect their research through IPR.
- ❖ **PO5** Student would be competent discipline-specific study, as well as to begin entrepreneurship.

Students Graduating With the Degree of M.Phil. Biotechnology should be able to Acquire

Core Competency

- The student will enable to learn and demonstrate about basic experimental techniques in classical and modern biotechnology.
- The students will able to understand and explain various aspects such as Plant and Animal Biotechnology, Research methodology, Genetic engineering, Molecular biotechnology, Geno-toxicology and Herbal Biotechnology.
- The students will gain sound knowledge in various fields including Insect Biotechnology, Microbial Biotechnology, Pharmaceutical Biotechnology, Medical Biotechnology and Environmental Biotechnology.

Analytical Ability

- The students will capable of demonstrate the knowledge in understanding research and addressing practical problems.
- Application of various scientific methods to address different questions by formulating the hypothesis, data collection and critically analyse the data.

Critical thinking and Problem solving ability



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- An increased understanding of fundamental scientific concepts, principles and their applications is expected at the end of this course. Students will become critical thinker and acquire in depth knowledge in problem solving capabilities.

Digital knowledge

- Students will acquire digital skills and integrate the fundamental concepts with modern biotechnological tools.

Ethical and Moral Strengthening

- Students will also strengthen their ethical and moral values.

Team Work

- Students will learn team work in order to serve efficiently in institutions, industry and society.

Duration

The M.Phil. Programme spans over a period one year from the commencement of the programme comprising of two semesters.

Course of Study

There are three courses for semester I and Dissertation and Viva-Voce for semester II.

The third course in the first semester shall be a specialization related to the dissertation.

Structure of Course

S. No.	Paper Code	Title of the paper	Exam Hours	Internal	External	Total Marks	Credits
FIRST SEMESTER							
Core Course							
1	MPBT01	Research Methodology	3	25	75	100	4
2	MPBT02	Plant & Animal Biotechnology	3	25	75	100	4
GUIDE PAPER							
1	MPBT03	Molecular Biology	3	25	75	100	4
2		Herbal Biotechnology	3	25	75	100	4
3		Insect Biotechnology	3	25	75	100	4
4		Microbial Biotechnology	3	25	75	100	4
5		Environmental Biotechnology	3	25	75	100	4
SECOND SEMESTER							
1		Dissertation				200	12

Dissertation / Project Work:

Part-II – Dissertation

The exact title of the Dissertation shall be intimated one month before the end of second semester. Candidates shall submit the Dissertation to the University through the Supervisor and Head of the Department at the end of the 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 at the time of submitting the dissertation.



5

Dissertation / Project Work		
Dissertation / Project Work	200 marks	
Concise Dissertation		150 marks
Viva-Voce		50 marks
Total		200 marks

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.

Passing Minimum:

A Candidate shall be declared to have passed if he/she secures not less than 50% of the marks in each course.

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 once. 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 unless he/she is declared to have passed both the parts of the examination as per the Regulations.

Qualifications for persons conducting the M.Phil. Course:

No teacher shall be recognized as a Supervisor unless he possesses a Ph.D. degree or two years of PG teaching experience after qualifying for M.Phil. degree.

Teaching Learning Outcome

The learning outcomes-based course curriculum framework of biotechnology is designed to persuade the subject specific knowledge as well as relevant understanding of the course. The academic and professional skills required for biotechnology-based professions and jobs are also offered by same course in an extraordinary way. In addition, the learning experiences gained from this course is designed and implemented for cognitive development in every student. The practical associated with this course helps to develop an important aspect of the Teaching -Learning process.

- ❖ Class Lectures
- ❖ Tutorials
- ❖ Seminars


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- ❖ Group discussions and Workshops
- ❖ Peer teaching and learning

Question Preparation

- ❖ Subjective Type
 - Analytical based question
 - Descriptive question
- ❖ Practical and project-based learning
- ❖ Field-based learning
- ❖ Substantial laboratory-based practical component and experiments
- ❖ Internship in industry, and research establishments

The effective teaching strategies are adopted to develop problem-solving skills, higher-order skills of reasoning and analysis. The designed course also encourages fostering the social values for maintaining and protecting the surrounding environment for improved living conditions. A learner centric and active participatory pedagogy is introduced in this framework.

Examination Pattern

Total Marks-100

Internal Assessment-25 Marks

External Assessment-75 Marks

Internal Assessment (25 Marks)

- | | |
|---------------------------------------|------------|
| 1. Monthly test and model examination | - 10 marks |
| 2. Seminar | - 5 marks |
| 3. Assignment | - 5 Marks |
| 4. Attendance | - 5 Marks |

External Assessment (75 Marks)

Section A

(Analytical Questions) (5x5=25 Marks)

(One question from each unit with internal choice – Answer all questions)

1. (a) or (b)
2. (a) or (b)
3. (a) or (b)
4. (a) or (b)
5. (a) or (b)

Section B

(Descriptive Questions) (5x10=50 Marks)

(One question from each unit with internal choice – Answer all questions)

1. (a) or (b)
2. (a) or (b)
3. (a) or (b)
4. (a) or (b)
5. (a) or (b)



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M.Phil. Biotechnology Syllabus
MPBT01: Paper I - Research Methodology

Credits: 4
Hours: 4/Wk

Course objectives:

Students will understand the various principles, working mechanism, and functions of instruments and techniques like Ultra centrifuge, Gradient centrifuge, FT-IR, AAS, Microscopy, HPLC, NMR, GC-MS, MALDI-TOF, AGE, PAGE Electrophoresis, PCR techniques, Western blot. In addition the concepts of experimental design, statistical analysis and Bioinformatics application will also be studied

Unit I

Centrifugation: Basic principles, Ultra centrifuge, Density Gradient Centrifugation and Sub cellular fractionation by differential centrifugation, Spectroscopy: UV-Visible Spectrophotometer, FT-IR and AAS.

Unit II

Microscopy: Fluorescence, Confocal, Scanning and Transmission Electron microscopes, Super Resolution Microscopy, Image analysis technique for living cells, Gel filtration, Affinity chromatography, HPLC, NMR, GC-MS, MALDI-TOF and Microarray technique. Autoradiography and Liquid Scintillation Counter.

Unit III

Electrophoresis methods: PAGE, Agarose gel electrophoresis, Capillary Electrophoresis, 2D-Electrophoresis and Gel Documentation. Histochemical and Immunotechniques: Antibody generation, detection of molecules using ELISA, Western blot and Immunoprecipitation.

Unit IV

Principles and techniques of Southern and Northern hybridization: Principles and applications of PCR, RT-PCR, and qPCR. Automated DNA sequencing, Next Generation sequencing, DNA Chip Technology, preparation of DNA probes and hybridization, FISH, DNA and Protein Microarray, Flow Cytometry, Chromatin Immunoprecipitation. Fermentor-Types, design and downstream process.

Unit V

Research Ethics, Research/Experimental design, Preparation of Research report, Measures central tendency and Dispersion, Standard error, Regression and Correlation analysis; Student's t-test; Analysis of Variance; Chi-Square test; Application of computers in biostatistics; Bioinformatics: BLAST N & P, multiple sequence analysis, Gene discovery



using EST. Genbank Databases: NCBI, EMBL & DDBJ. Protein sequence Database: Swiss Prot & PDB.

Reference Books

- Keith Wilson and John Walker, 2010. Principles and Techniques of Biochemistry and Molecular Biology. 7th Edn. Cambridge University Press.
- Wayne W. Daniel, Chad L. Cross. 2013. Biostatistics: A foundation for Analysis in the Health Sciences. 10th Edn. Wiley Series in Probability and Statistics.
- Rastogi S. C., Mendiratta N. and Rastogi P. 2013. Bioinformatics Methods and Applications Genomics, Proteomics, and Drug Discovery. 3rd Edn. PHI Learning.
- Terrance G. Cooper. 1977. Tools in Biochemistry. Wiley-Interscience publication, New York.
- Joseph Sambrook & David W. Russell. 2001. Molecular Cloning – A laboratory Manual. 3rd Edn. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.
- Charles N. Rely, Donalds. T. Sawyer, Robert E. Krieger Huntington. 1979. Experiments of Instrumental methods: A Laboratory Manual, New York.
- Gelvin, S.B., and Schilperoort, R.A. 2000. Plant Molecular Biology Manual, 2nd Edn. Springer Netherlands.
- Norman T.S. Bailey, 1995. Statistical Methods in Biology. 3rd Edn. Cambridge University Press, UK


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Course learning outcome:

By the end of the course, the student should able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the Principle and Working of biotechnological equipments.	K2 – K5
CO2	Acquiring knowledge of working mechanisms of microscopy, imaging and analytical instruments	K3- K5
CO3	Understanding the principles and working of electrophoretic, histochemical and immunotechniques	K4 - K5
CO4	Understanding the principles and applications of molecular biology techniques.	K4 – K5
CO5	Unserstanding the fundamental concepts of experimental design, biostatics and Bioinformatics	K2-K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	S	M	M
CO3	M	S	S	S	M
CO4	M	M	S	S	S
CO5	S	S	M	S	S

S- Strong; M-Medium



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