



# **PERIYAR UNIVERSITY**

**PERIYAR PALKALAI NAGAR**

**SALEM – 636011**

**DEGREE OF MASTER OF PHILOSOPHY**  
**CHOICE BASED CREDIT SYSTEM**

**SYLLABUS FOR**  
**M.PHIL - MICROBIOLOGY**  
**( SEMESTER PATTERN )**

**( For Candidates admitted in the Colleges affiliated to  
Periyar University from 2017-2018 onwards )**



## REGULATIONS

### 1. ELIGIBILITY

Candidates who have qualified for post graduate degree (any biological science) of this university or any other University recognized by the syndicate as equivalent there to shall be eligible to register for the Degree of Master of Philosophy (M. Phil) in their respective subject and undergo the prescribed course of study in an approved institution or department of this University.

Candidates who have qualified their postgraduate degree on or after 1st January, 1991 shall be required to have obtained a minimum of 55% of marks in their respective postgraduate degrees to become eligible to undergo the prescribed course of study in an approved Institution or department of this University.

In the case of teachers (or) others registering for part time registration, the minimum percentage of marks for registration is 50%.

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.

### 2. DURATION

The duration of the M. Phil course shall extend over a period of one year from the commencement of the course.

### 3. COURSE OF STUDY

Course of study for the degree shall consist of (a) Part-I comprising three written papers according to the Syllabus prescribed from time to time: and (b) Part-II Dissertation.

Part –I shall consist of Paper –I Research Methodology and Paper –II an advanced paper in the main subject. There shall be a third paper which shall be the background paper relating to the proposed Dissertation conducted internally by the College/Departments.

### 4. SCHEME OF EXAMINATIONS

Part-I Written Examination: Paper I, II & III

The examination of papers I, II and III shall be held at the end of the year. The duration for each paper shall be 3 hours carrying a maximum of 100 marks.

Paper –III examination will be conducted by the College/ Departments and the marks obtained by the candidate along with the question paper and valued answer scripts shall be sent to the University at least 15 days before the commencement of the

examinations of paper I and II.

The examiners will be appointed from the panel of four name of each paper (I and II) submitted by the college/ Departments concerned. If one examiner awards a pass mark and the other fail mark the paper will be valued by a third examiner whose award of marks will be final.

### **Part-II: Dissertation**

The exact title of the Dissertation shall be intimated with in one month after the completion of the written examination. 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/Principal at the time of submitting the Dissertation.

The examiners who value the Dissertation shall report on the merit of candidates as “Highly Commended” (75% and above) or “Commended” (50% and above & 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 the third valuation and his valuation shall be final. Submission or resubmission of the Dissertation will be allowed twice a year.

The allotment of marks for (i) Theory (ii) Dissertation and Viva Voce are as follows:

#### **(i) Theory Papers**

Internal	:	25 Marks
External	:	75 Marks
Total	:	100 Marks

#### **(ii) Project Dissertation**

Dissertation:	150 Marks
Viva Voce	: 50 Marks
Total	: 200 Marks

#### **Internal assessment for course I, II and III**

Test	:	10 Marks
Seminar	:	10 Marks
Attendance	:	05 Marks
Total	:	25 Mark

S.No.	Paper	Title of the Paper	Exam Hrs	Max. Marks
1.	Part I	Research Methodology and its Applications	3	100
2.	Paper II	Advances in Microbiology	3	100
3.	Paper III	Guide Paper	3	100
4.	Part II	Dissertation	-	200
		<b>Total</b>		<b>500</b>

## 5. PASSING MINIMUM

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

A candidate shall be declared to have passed Part-II of the examination if his/her dissertation is at least commended, or else the candidate shall be declared to have failed in the examination.

## 6. 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.

## 7. 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.

## 8. 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 or M.Litt. Degree.

Only the post graduate departments of affiliated colleges and departments of the University will be recognized for conducting the M.Phil course provided; however, the Syndicate shall have the power to decide any other institutions of higher learning / research within the University area for conducting the M.Phil course on merits.

## COURSE OF STUDY AND SCHEME OF EXAMINATION

Part	Course	Course Code	Name of the Course	Credits	Marks		
					IA	UE	Total
I	I	Paper I	Research Methodology and its Applications	4	25	75	100
	II	Paper II	Advances in Microbiology	4	25	75	100
	III	Paper III	Research Background Paper (Guide Paper)	4	25	75	100
II	IV	Paper IV	Dissertation and Evaluation Viva voce	8+4 (12)	50	100	150 50
			<b>Total</b>	<b>24</b>			<b>500</b>

## **M.PHIL. MICROBIOLOGY**

### **PART - I**

### **PAPER - I**

## **RESEARCH METHODOLOGY AND ITS APPLICATIONS**

### **OBJECTIVE**

This paper is aimed at providing exposure to the students on the basic skills for becoming a researcher in Microbiology.

### **UNIT I**

Research Guidelines - Problem selection and project designing. Review of literature, source of collection, processing of data, presentation of data, error, editing the final draft and presentation of research project.

### **UNIT II**

Basic Biostatistics - Collection, Classification and Tabulation of data. Graphical and diagrammatical representation – Scale diagram-Histogram- frequency curve. Correlation- regression, Student's t- test, Chi square test, F-test, ANOVA and Post-Hoc tests.

### **UNIT III**

Applied Biostatistics - Measures of central tendency- Arithmetic mean , Median, Mode. Calculation of Mean, median and Mode in series of individual observations, discrete series, continuous, open end classes, measure of dispersion, standard deviation, standard error.

### **UNIT IV**

Chromatography and Electrophoresis:- Chromatography – Thin layer chromatography - Gas chromatography - Column chromatography - Ion exchange chromatography - Gel exclusion chromatography - HPLC Affinity chromatography and Immuno-adsorption. Electrophoresis, PCR, RAPD, RFLP, Immuno techniques.

### **UNIT V**

Colorimetry and Centrifugation:- Colorimetry - Ultraviolet - Visible spectrophotometry - principles, instrumentation - applications, Fluorescence spectrophotometry, Flow Cytometry, ELISA. Centrifugation - principles - instrumentation for centrifuges - bench top - high speed- ultracentrifuge-applications.

### REFERENCE BOOKS:

1. Boyer, R.F. 1993. Modern experimental Biochemistry. The Benjamin Cummings Publishing Co.
2. Wilson, K and J. Walker. 1995. Practical Biochemistry. Principles.
3. Glick B.R and J. J. Pasternak. 1994. Molecular Biotechnology, ASM Press, Washington.
4. Rosner, B. (1999). Fundamentals of Biostatistics. Duxbury Press.
5. Motulsky, H. (1995). Intuitive Biostatistics. Oxford University Press.
6. Recombinant DNA safety guidelines, (January 1990), Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi.
7. Gurumani, N., (2006). Research methodology for biological sciences (1st Edition). MJP Publishers. A unit of Tamil nadu Book House, Chennai.
8. David W. M., (2001). Bioinformatics. Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press.
9. Higinns, D. and W. Taylor (Eds.), (2000). Bioinformatics. Sequence, Structure and databanks- A Practical Approach. Oxford University Press.
10. Palanivelu P (2004). Analytical Biochemistry and Separation techniques. Third edition, MKU Co-op, Press Ltd., Palkalai Nagar, Madurai.
11. Upadhyay & Upadhyay. Biophysical Chemistry, (2010). Himalaya Publishing house.
12. Glantz, S.A. (2001). Primer of Biostatistics. McGraw – Hill.

### WEB REFERENCES

1. [http://www.math.yorku.ca/scs/statResource.html# General](http://www.math.yorku.ca/scs/statResource.html#General)
2. <http://www.anest.ufl.edu/computer/index.html>
3. <http://www.jegsworke.com/Lessons/index.html>
4. <http://www.bettycjung.net/statsites.html>
5. <http://www.biostat.harvard.edu/links/>
6. <http://www.ped.mod.utah.edu/genpedscrr/Epibio.html/>



**M.PHIL. MICROBIOLOGY**  
**PART - I**  
**PAPER - II**  
**ADVANCES IN MICROBIOLOGY**

**OBJECTIVE**

This paper provides information about the latest and advanced knowledge of microbiology.

**UNIT I**

Historical development of Microbial technology- Introduction – Contribution of Louis Pasteur, Robert Koch, Alexander Fleming, S.A. Waksman and others in the development of microbiology and the early discoveries. Industrially important microorganisms. Products obtained from microorganism. Isolation, purification and preservation of microbes. Cell culture techniques – aseptic transfer.

**UNIT II**

Microbes in Medicine- Clinically important microorganisms and their effects on infection and immunity. Production of toxins by microorganism. Disease caused by pathogens and their control. Production of medicinally important substances by microbes. Production of useful non microbial products produced through recombinant microbes – insulin, vaccines, and antibiotics. Production of antibodies in E. coli.

**UNIT III**

Microbial Products and their bioprocesses- Single cell protein – Chlorella, Spirulina, Yeasts, Mushrooms – SCP from wastes. Economic implications of SCP. Microbial production of enzymes – cellulase, lipase, Taq polymerase, and restriction endonuclease. Production of wine, vinegar and alcohol. Biofertilizers – cyanobacteria, Azospirillum, VAM and Azolla. Strategies applied for drug discoveries.

**UNIT IV**

Biodegradation and Bioremediation- Microbes involved in biodegradation of organic wastes and xenobiotic compounds – heavy metals, pesticides, insecticides. Bio insecticides – BT toxin. Microbial leaching – Extraction of metals from ores. Biofuels, Microbial hydrogen production. Biodegradation of oils and petroleum products.

### UNIT V

IPR, Biosafety and bioethics- World Trade Organization (WTO) with reference to biotechnology affairs – Basic requirement of patentability, process of patenting, patenting biological materials. National & International patent laws. Biosafety regulations and assessment of biotechnology products – drugs/vaccines & GMO. Biosafety protocols – Biological weapons. Principles of bioethics – ethical conflicts in biotechnology.

### REFERENCE BOOKS:

1. Prescott LM, Harley JP and Klein DA (2003) Microbiology (10th edition) McGraw Hill, New York.
2. Pelczar Jr, M.J. Chan, E.C.S and Krei N.R (1993) Microbiology McGraw Hill, New York.
3. Stanbury, P.F., Whittaker, A and Hall, S.J., (1995) Principles of fermentation technology, Elsevier; 3rd edition.
4. Cassida, J.E., (1968). Industrial Microbiology, New Age International (2007).
5. Bernad R Glick (2003). Molecular Biotechnology - Principles and Applications of Recombinant DNA. Third edition, ASM Press, Washington, D.C.
6. Satyanarayana (2005). Biotechnology. First edition, Books and Allied (P) Ltd., Kolkata.
7. Dubey RC (2005). A Text of Biotechnology. Multicolour Illustrative edition, S.Chand and Company Ltd., New Delhi.
8. Ananthanarayan R and Jayaram Paniker CK (2005) Text Book of Microbiology. Seventh edition, Orient Longman Limited, Hyderabad.
9. Jawetz, Melnick, & Adelberg's. (2013). Medical Microbiology. 26th Edition. McGraw-Hill.
10. Subba Rao NS (2004). Soil Microbiology. Fourth edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

**M. Phil. Degree Examination,  
MONTH & YEAR  
M.Phil - Microbiology  
Paper title**

Time: 3 Hours

Max. Marks:75

**PART – A (5x5=25)**

Answer All Questions.

All Question carry equal Marks.

**UNIT – I**

Qn. No.1 a).  
(or)  
b).

**UNIT – II**

Qn. No.2 a).  
(or)  
b).

**UNIT – III**

Qn. No.3 a).  
(or)  
b).

**UNIT – IV**

Qn. No.4 a)  
(or)  
b)

**UNIT – V**

Qn. No.5 a).  
(or)  
b).

**PART – B (5x10=50)**

Answer All Questions.

All Question carry equal Marks.

**UNIT – I**

Qn. No.6 a).  
(or)  
b).

**UNIT – II**

Qn. No.7 a).  
(or)  
b).

**UNIT - III**

Qn. No.8 a).  
(or)  
b).

**UNIT – IV**

Qn. No.4 a)  
(or)  
b)

**UNIT – V**

Qn. No.5 a).  
(or)  
b).

