

**PERIYAR UNIVERSITY
SALEM – 636011**

DEGREE OF MASTER OF PHILOSOPHY

M.Phil. MICROBIOLOGY

SYLLABUS

(Candidates admitted from 2009-2010 onwards)

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 he 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	: 100 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 Marks

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

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 recognised 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.

M.Phil. MICROBIOLOGY (Choice Based Credit System)**Course of Study**

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

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 Methodology – Introduction, importance, identification of research areas, Review of Literature- Identification of knowledge gap areas and constraints - Review and synopsis presentation. Research process, Research design and experimentation - Preparation of research report.

Unit II Biostatistics - Principles and importance. Population parameters and sample estimates. Frequency distributions, Frequency polygons, Probability curve, Measures of central tendency, Variability, z-scores, Correlation- regression, Student's t- test, Chi square test, F-test , ANOVA and Post-Hoc tests.

Unit III Micro-Biotechniques - Microscopy, Electrophoresis, PCR, RAPD, RFLP, Immunotechniques, Histochemical studies; Fermentors – Design, types, upstream and downstream Process.

Unit IV Analytical Techniques - Centrifugation, Column, Gas and High Pressure Liquid Chromatography, Spectrophotometry, Fluorimetry, NMR, Atomic Adsorption and Mass Spectroscopy, X-ray diffraction, Radio isotope techniques, GM Counter and Scintillation Counter.

Unit V Bioinformatics and IPR- An overview of Bioinformatics. Computing tools phylogenetics and computational biology. Genomics, Proteomics. Drug design and commercial bioinformatics. Intellectual property rights, patents, trade secrets, copyrights, trade mark. Patenting transgenic organisms. Plant breeder's right. Ethics in animal biotechnology.

Text Books

1. Bajpai, S. (Ed.), (2006). Biological instrumentation and methodology. Chand & Company Ltd., New Delhi,
2. Jeffrey A. W. and L. S. Myra, (2002). Statistics for the Life Sciences (3rd Edition). Prentice Hall
3. Attwood T.K. and D.J. Parry-Smith, (2001). Introduction to Bioinformatics Pearson Education, Asia.
4. Subbaram, N., (2003). Patents. Pharma Book Syndicate, Hyderabad.
5. Glick, B.R. and J.J. Pasternack, (1998). Molecular Biotechnology (2nd Edition). ASM Press, Washington, DC.
6. Recombinant DNA safety guidelines, (January 1990), Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi.
7. Revised guidelines for research in Transgenic plants, (August 1998), Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi.

References

1. Webster, J.G., (2004). Bioinstrumentation. Student Edition. John Wiley and Sons, Ltd.
2. Wilson, K. and J. Walker, (2003). Practical Biochemistry Principles and Techniques (5th Edition). Cambridge University Press.
3. Gurumnani, N., (2006). Research methodology for biological sciences (1st Edition). MJP Publishers. A unit of Tamilnadu Book House, Chennai.
4. Glantz, S.A., (2001). Primer of Biostatistics. McGraw-Hill.
5. Rosner, B., (1999). Fundamentals of Biostatistics. Duxbury Press.
6. Motulsky, H., (1995) Intuitive Biostatistics. Oxford University Press.
7. David W. M., (2001). Bioinformatics. Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press.
8. Higgins, D. and W. Taylor (Eds.), (2000). Bioinformatics. Sequence, Structure and databanks- A Practical Approach. Oxford University Press.
9. Baxevanis, A.D. and B.F. Francis Ouellette (Eds.), (2001). Bioinformatics - A Practical Guide to the Analysis of Genes and Proteins. Wiley-Interscience.
10. Gibson, G. and S.V. Muse, (2002). A Primer of Genome Science. Sinauer Associates, Inc. Publishers.
11. Methods in Molecular Biology (Vol 132)- Bioinformatics. Methods and Protocols (2000) by S. Misener and S.A. Krawetz (Eds.), Humana Press.
12. Claverie J.M and C. Notredame, (2003). Bioinformatics for Dummies. Wiley Publishing, Inc.

Web References

<http://www.math.yorku.ca/scs/statResource.html#> General
<http://www.anest.ufl.edu/computer/index.html>
<http://www.jegsworks.com/Lessons/index.html>
<http://www.bettycjung.net/statsites.html>
<http://www.biostat.harvard.edu/links/>
<http://www.ped.mod.utah.edu/genpedscrr/Epibio.html>

Paper-II

ADVANCES IN MICROBIOLOGY

Objective

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

Unit I Microbial techniques: Confocal Microscopy, DNA Microarray for comparative and Evolutionary Genomics: Flow cytometry: Photo and video Micrography and Autoradiography. Atomic flame photometry, Plasma emission spectroscopy, Infra-red spectrophotometry. Tandem mass spectroscopy, Electron Spin Resonance spectroscopy.

Unit II Current trends: Exploration of bioactive compound from Extremophiles. Bio remediation, Bio sensors. Biofuel. Biofilms. Remote sensing microbiology.

Unit III Microbes and Health: GLP, Laboratory and hospital acquired infection. Emergence of MDR and XDR microbes. Harmful microbes and biological weapons. Automated diagnostic method. Recombinant vaccines. Environmental aspects of emerging diseases.

Unit IV Microbial Technology: Microbes in Nanotechnology, Biopolymers, Biosurfactants, Biofertilizers, Biopesticides, Bioluminescence, Genetically modified organisms. Gene therapy, Stem cell therapy.

Unit V Microbial Pharmaceutics and Biotechniques: Drug discovery and design, Marine microbial antibiotics, Microbial therapeutic enzymes, Microbial pigments, Single cell proteins.

Text books

1. Jawetz, E., J.L. Melnick and E.A. Adelberg, (1998). Review of Medical Microbiology (19th Edition). Lange Medical Publications, ELBS, London.
2. Chakraborty, P., (2003). A text book of Microbiology (2nd Edition). Published by New central book agency (P) Ltd., Kolkata.
3. Glick, B.R., (2003). Molecular Biotechnology. Principles and Applications of Recombinant DNA. (3rd Edition). ASM Press, Washington DC.
4. Jogand, S.N., (2004). Gene Biotechnology. Himalaya Publishing house, Mumbai.
5. Webster, J.G., (2004). Bioinstrumentation. Student edition, John Wiley and Sons Pvt Ltd., University of Wisconsin.
6. Palanivelu, P., (2001). Analytical biochemistry and separation techniques – A Laboratory Manual (2nd Edition). Tulsi book centre (Publication), Madurai, Tamilnadu.
7. Purohit, S.S., (2003). Pharmaceutical microbiology.

References

1. Young, M.M. (Ed.), (2004). Comprehensive Biotechnology. The Principles, Applications and Regulations of Biotechnology in Industry, Agriculture and Medicine, Vol 1, 2, 3 and 4. Elsevier India Private Ltd, India
2. Prave, P., U. Faust, W. Sittig and D.A. Sakatsch (Ed.), (2004). Fundamentals of Biotechnology. Panima Publishing Corporation, India.
3. Mansi, E.M.T.E.L. and C.F.A. Bryle, (2002). Fermentation Microbiology and Biotechnology. Taylor & Francis Ltd, UK.
4. Crueger, W. and Crueger, A., (2000). Biotechnology: A Textbook of Industrial Microbiology. Panima Publishing Corporation, India.
5. Stanbury, P.F., A. Whitaker and S.J. Hall, (1997). Principles of Fermentation Technology. Aditya Books Pvt Ltd, India.

Web References

1. <http://gsbs.utmb.edu/microbook/toc.html>
2. <http://www.biosci.ohio-state.edu/~mgonzalez/micro521.html>
3. <http://bioweb.uwlax.edu/Genweb/Microbiology/General/general.html>
4. <http://www.medunich.edu/TAMC/LINKS.HTML>
5. <http://acs.ucalgary.ca/~browder/transgeni.html>