DEPARTMENT OF BIOCHEMISTRY
PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM - 636 011

M.Phil Biochemistry Syllabus

(Candidates admitted from 2017-2018 onwards)

M.Phil. BIOCHEMISTRY SYLLABUS

(Candidates admitted from 2017-2018 onwards)

Full Time

1. Eligibility for admission

Candidate who have qualified for post graduate degree in Biochemistry or Biological Science of any recognized university shall be eligible to regist er for the Degree of Master of Philosophy (M.Phil) in Biochemistry .

For full-time M.Phil registration, candidates shall be required to have obtained a minimum of 55% marks .except for whom have qualified their P.G degree on or before 1st January 1991 and those who have qualified for the Masters Degree before 01.01.91.

In case of teacher or other candidates registering for part –time M.Phil candidates belonging to SC/ST community, the minimum percentage of marks for registration is 50%.

2. Duration

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

3. Structure of the Course

The course of study for the degree shall consist of Part –I comprising three written papers according to the Syllabus prescribed from time to time. Part I shall consist of Paper I Research Methodology and Paper II Analytical Technique. There shall be a third paper which shall be the background paper relating to the proposed Dissertation conducted internally by the department .

Part–II is Dissertation.

Part	Course	Course code	Name of the Course	Credits	Marks
I	I	17MPBC01	Research Methodology	4	100
	II	17MPBC02	Analytical Techniques	4	100
	III	17MPBCE01	Guide Paper	4	100
II	IV	17MPBCD01	Dissertation and Viva voce	12	200
		Total		24	500

4. Scheme of Examination

Part –I : Written Examination (Papers I, II and III)

The examination of paper 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 a maximum of 100 marks.

Paper –III examination will be conducted by the Departments and the marks obtained b 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.

Part II : Dissertation

The exact title of the Dissertation shall be intimated within 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 th e Head of the Department/ at the time of submitting the Dissertation.

The examiners who value the Dissertation shall report on merit of candidate 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 the third 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

(iii) Internal assessment for course I, II and III

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

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. All other candidates 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.

17MPBC01

RESEARCH METHODOLOGY

UNIT I

Scientific Research

Introduction to scientific research, updation of research and its applications. Choosing a topic and formulation of hypothesis. Designing and investigation techniques to be employed, analysis of results.

Scientific writing – logical format for thesis writing and research articles– abstract, introduction, review of literature, materials and methods, results and discussion – illustration by tables and figures, discussion, and bibliography – Harvard and Vancouver systems.

UNIT II

Bioinformatics

The scope of bioinformatics. The internet. The world wide web. File formats. Biological data bases-sequence and structure-NCBI,PDB, EXPASY. Data retrieval – the Entez system. Searching sequence databases – sequence similarity searches, substitution matrices. Sequence analysis: Sequence alignment, pairwise and multiple sequence alignment, local and global alignment, BLAST, FASTA, CLUSTALW. Molecular docking, software applied for molecular docking.

UNIT III

Biostatistics

Collection and classification of data – diagrammatic and graphic representation of data – measurement of central tendency, Measures of dispersion, Correlation and Regression analysis- relation between two variables, scatter diagram, definition of correlations, curve fitting, principles of least squares, Two regression lines, Test of significance based on large samples and small samples, Student t test, ANOVA, DMRT, Use of SPSS software. Probability theory: Random experiments, sample space, probability theory, conditional probability.

UNIT IV

Safety, general guidelines and funding agencies

Biosafety – Introduction. Levels of Biosafety. General guidelines and practices. Guidelines for DNA research activities. Good laboratory practices. Research bodies & funding agencies – UGC, CSIR, ICMR, DST, DBT, ICAR, DAE, DRDO, DOD, Fellowships – Junior, Senior Research Fellowships and Research associates.

UNIT V

Bioethics and Patenting

Declaration of Bologna, Ethics in animal experimentation, CPCSEA guidelines – animal care and technical personnel, environment, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia. Composition of (human) Institutional evaluation Ethical Committee (IEC) – Beneral ethical issues. Ethics in food and drug safety. Ethical issues in human gene therapy, cloning and embryonic stem cell. Patenting – definition of patent – different types of intellectual property rights, Case studies of patents (basmati rice, turmeric, neem).

Reference Books

1. Gupta,S.P. 2011. Statistical Methods, 4th Edition, Sultan Chand & Son Publishers.

2. Lesk, A.M. 2002. Introduction to Bioinformatics, Oxford University Press.

3. Kothari C.R. 2013. Research Methodology : Methods and Techniques, 3rd Edition, New Age Publishers

4. Day.R.A. 1989. How to write and publish a scientific paper. 3rd Edition, Cambridge University Press.

5. CPCSEA Guidelines for Laboratory Animal Facility.

6. Ethical guidelines for Biomedical Research on human subjects. ICMR, New Delhi, 2006.

7. Cooray. P.G.Guide to scientific and technical writing.

ANALYTICAL TECHNIQUES

UNIT I

Spectroscopy and Centrifugation

Principle, instrumentation, and applications of UV-visible spectrophotometry, Vibrational spectroscopy, NMR, ESR. X-ray diffraction. Atomic spectroscopy – principle and applications of atomic flame and flameless spectrphotometry.

Principle, instrumentation and applications of centrifugation. Preparative ultracentrifugation – differential centrifugation, density gradient centrifugation (rate-zonal & isopycnic).

UNIT II

Chromatography and Electrophoresis

General principles, instrumentation and applications of chromatography – TLC, GLC, HPLC, ion exchange, molecular exclusion, affinity chromatography.

General principles and instrumentation. Electrophoresis of proteins – native gels, SDS Page, Isoelectric focusing, 2-D PAGE. Electrophoresis of nucleic acids, DNA sequencing gels, pulsed – field gel electrophoresis.

UNIT III

Radiation and Immunotechniques

Principles and applications of tracer techniques in biology. Radiation hazards, prevention and safety measures. Detection and measurement of radioactivity, solid and liquid scintillations counting. Autoradiography.

Production and applications of antisera and monoclonal antibodies, Antigen – antibody interaction – precipitation reaction, immunodiffusion, RIA and ELISA – hormonal assay. Complement fixation. Immuno-histochemistry,

UNIT IV

Molecular Biology Techniques

Preparation of probes, Sequencing DNA – Maxam and Gilbert method,

Sangers method, Blotting techniques -Southern, Northern and western analysis. DNA finger printing, footprinting. PCR – principle and applications – RT PCR, DNA and protein arrays. Genome and proteome analysis – EI – MS, MALDI-TOF.

UNIT V

Cell and Tissue Culture Plants and Animals

Animal cell and tissue culture –primary culture and cell lines, pluripotent stem cell lines, organ and embryo culture.

Plant cell and tissue culture media, tissue culture, micropropagation and somoclonal variation, production and uses of haploids, protoplast culture, regeneration and somatic hybridization. Gene transfer methods in plants.

Reference Books

1. Wilson,K. and Walker,J. 2010. Principles and Techniques of Biochemistry and Molecular Biology, 7th Edition , Cambridge University. Press.
2. Upadhyay,A. Upadhyay,K. and Nath,N. 2016. Biophysical Chemistry: Principles and Techniques, 4th Edition, Himalaya Publishing. 11 th Edition.
3. Heldt,H.W. and Piechulla,B. 2016. Plant Biochemistry, 4 th Edition, Academic Press.
4. Lodish *et al*. 2012. Molecular Cell Biology, 7th Edition, W.H. Freeman and Co.
5. Brown,T.A. 2010. Gene cloning and DNA analysis: An introduction, 6 th Edition, Wiley-Blackwell Publishers.
6. Owen,J.A. *et al.*, 2013. Kuby Immunology, 7th Edition, W.H. Freeman and Company.