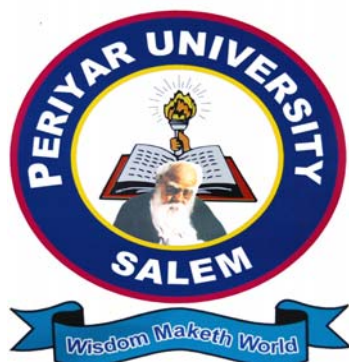


**PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011**



**DEGREE OF MASTER OF PHILOSOPHY
CHOICE BASED CREDIT SYSTEM
SYLLABUS FOR M.PHIL. BIOTECHNOLOGY
FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2012 – 2013 ONWARDS**

Course Structure:

Part	Course	Course code	Name of the course	Credit	Marks		
					IA	UE	Total
I	CoreI		Research Methodology	4	25	75	100
	CoreII		Applied Biotechnology	4	25	75	100
	CoreIII		Guide paper (To be framed by the Guide in accordance with dissertation work)	4	25	75	100
II	Core		Dissertation & Viva-voce	12 (8+4)			200
			Evaluation	-	50	100	150
			Viva voce -50 (25+25)				50
			Total	24			500

Mark Distribution

Total marks : 100

Internal assessment (IA) – 25 marks

University external (UE) - 75 marks

Distribution of Marks for IA

Attendance - 5marks

Seminar - 10 marks

Test - 10marks

QUESTION PAPER PATTERN FOR UE

Max. Marks: 75

Time : 3 Hours

Section – A (5x5 = 25 marks)

Answer All the Questions

(Internal choice- One Question from each unit)

Section – B (5x10 = 50 marks)

Answer All the Questions

(Internal choice - One Question from each unit)

CORE I - RESEARCH METHODOLOGY

UNIT I:

Research methods – Steps in research – Selection of research problem – Research design –Preparation of manuscript - Contents of research report – Abstract, Introduction, Review of literature, Materials and methods, Results, Discussion, Summary, Bibliography.

Statistical methods – Data collection – Data presentation – Diagrams and Graphs. Data analysis – Measures of central tendencies, Standard deviation, Correlation, Regression and ANOVA. Statistical Software – SPSS.

UNIT II:

Microscopy – Principles and applications of Light, fluorescent, Phase contrast, SEM, TEM and Confocal Microscopes. Electrophoresis – Principles and applications of AGE, PAGE, 2D-PAGE, PFGE, Isoelectric focusing. Blotting techniques. **Chromatography** – Principles and applications of GLC, HPLC, Ion exchange and affinity chromatography.

UNIT III:

Principles of sedimentation- Centrifugation techniques- Density gradient centrifugation & Ultra centrifugation. **Molecular methods** – Principles and applications of PCR, RFLP, RAPD, Nucleic acid labeling. DNA sequencing methods and Micro arrays. Immunological techniques- ELISA, IFT and FACS.

UNIT IV:

Biochemical methods: Laws of absorption- Principles and applications of UV- Visible Spectrophotometer, AAS, NMR, ESR Spectroscopy, MALDI, FTIR. X- Ray diffraction. **Radioisotope techniques**- Principles and applications of radio isotopes, Autoradiography and Liquid scintillation spectrometry.

UNIT V:

Biological Databases- uses –Sequence databases-Nucleic acid ,Proteins-Structural databases- PDB, CATH. Specialized databases – KEGG,OMIM, Sequence analysis – Local

Alignment , Global alignment- BLAST, Multiple sequence alignment-ClustalW, Phylogenetic analysis, Secondary structure prediction – GOR, Chau-Fasman method, restriction site analysis, molecular visualization tool-Rasmol.

REFERENCE BOOKS:

1. Wilson, K. & Walker, J. (2003). Practical Biochemistry. Fifth edn. Cambridge University Press.
2. Palanivelu, P (2001). Analytical Biochemistry and Separation techniques. Tulsi Book Centre, Madurai.
3. Gurumani, N. (2006). Research Methodology for Biological sciences. MJP publishers, Chennai.
4. David Mount. (2001). Bioinformatics. Sequence and Genome analysis. Cold Spring Harbor Laboratory Press.
5. Prakash, M & C.K. Arora. (1999). Laboratory instrumentation. Anmol Publications pvt Ltd.
6. Khan & Khanum. Fundamentals of Biostatistics. Ukaaz Publications.
7. Sambrook, Fritsch and Maniatis. (1989). Molecular Cloning- A laboratory manual. Cold Spring Harbor Laboratory Press.
8. John Webster , (2004). Bioinstrumentation. John Wiley & sons.
9. Mark Schena. (2002). Microarray analysis. First edn. John Wiley & sons Ltd.
10. Prescott LM, Harley JP and Klein DA (2005) Microbiology, 6th Edition. McGraw Hill.
11. Upadhyay, A., Upadhyay & Nath (2006). Biological Chemistry, II Edn. Himalaya Publishing House.

CORE II - APPLIED BIOTECHNOLOGY

UNIT I: Plant Biotechnology

Genetic engineering of Herbicide resistant plants, Insect resistance, Viral resistance – Stress tolerant plants, flower pigmentation,- modification of nutritional content, Delayed fruit ripening, Artificial seeds, Terminator seed technology, Nif gene transfer. Intellectual Property Rights.

UNIT II: Animal Biotechnology

Transgenic animals (Cattle, Mice) , super ovulation, Embryo transfer, IVF, Preservation Methods. Production of recombinant products – Growth hormones, Human interferons. Dairy Biotechnology, Seri technology. Stem cell therapy. Ethical issues of animal Biotechnology.

UNIT III: Bioprocess technology

Fermentation – Types, Fermentor- Types, Strain improvement, Media formulation, Upstream & Down stream processing. Production of industrially important enzymes, antibiotics, organic acids, Vitamins & aminoacids.SCP. Role of GMOs in Biodegradation. Bioleaching

UNIT IV: Immunotechnology

Immunoglobulin genes – functions & phylogenetic analysis. Isolation, characterization, purification and production of lymphocytes. Role of Immuno Suppressors and Modulators. Molecular Immunodiagnostic methods. Specificity of T- cell receptors. Role of Biotechnology in Vaccine production. Monoclonal antibodies.

UNIT V: Nanobiotechnology:

Nanoparticles- Metals. Biological networks. Bionano Particles- nanostarch, nanoparticulate, nanocomposites,nanobiosensors. Dentrimer as nanoparticulates. Nanotechnology in Molecular diagnosis. Nanotechnology in drug Discovery & Delivery. Applications of nanomaterials in medicine. Ethical considerations of Nanobiotechnology.

REFERENCE BOOKS:

1. J.Hammond, P.McGarvey and V.Yusibov 2000. Plant Biotechnology. Springer verlag.
2. Paul Christou and Harry Klee. (2004). Hand Book of Plant Biotechnology. Vol I& II. John Wiley & Sons. Ltd.
3. H.S.Chawla. 1998. Biotechnology in crop improvement. International Book Distributing Company.
4. Nigel Jenkins. Animal Cell Biotechnology: Methods and protocols. Humana Press.
5. John,R.W.Masters. (2000). Animal Cell Culture- Practical approach. Third edn. Oxford University Press.
6. U.Satyanarayana. 2005. Biotechnology. Books and Allied (p) Ltd.
7. Peter F. Stanbury. Principles of Fermentation Technology. Butterworth-Heinemann, Elsevier Science Ltd.
8. Alexender. N. Glazer & Hiroshi Nikaido.W.H. (1995) Microbial Biotechnology. Freeman and Company.
9. Rajasekara Pandian M and Senthilkumar B (2007) Immunology and Immunotechnology. Panima Publishing Corporation , New Delhi.
10. Kuby J (1997) Immunology 3rd Edn .WH Freeman &Co. New York.
11. Christof M.Niemayer,Chad A.Mirkin (2004). Nanobiotechnology : concepts, applications and perspectives. Wiley VCH publishers

MODEL QUESTION PAPER

Time: 3 Hours

Max: 75 marks

Section-A

(5x5 = 25 marks)

Answer ALL the questions choosing either (a) or (b)

1. (a) Elucidate the steps involved in research.

(Or)

(b) Analyze the methods used in data collection.,

2 (a) Comment on 2D-PAGE.

(Or)

(b) Describe the principle of affinity chromatography.

3 (a) Analyze the principle involved in ultra centrifugation.

(Or)

(b) Briefly explain about RAPD.

4 (a) Write short notes on Autoradiography.

(Or)

(b) With a neat diagram, explain the principle of Spectrophotometer.

5 (a) Analyze the methods used for secondary structure prediction.

(Or)

(b) Trace the role of Rasmol in molecular visualization.

Section-B

(5x10 = 50 marks)

Answer ALL the questions choosing either (a) or (b)

6 (a) Enumerate the steps involved the preparation Of your research report.

(Or)

(b) Discuss the Analysis Of Variance and its applications.

7 (a) Describe the principle and methodology of AGE & PAGE.

(Or)

(b) Describe the principle and applications of Electron microscope.

8 (a) Discuss the principle and applications on DNA array technique.

(Or)

(b) Analyze the principle of different immunological techniques that you have studied.

9 (a) Give a detailed account on MALDI – TOF.

(Or)

(b) Explain the principle and applications of Nuclear Magnetic Resonance spectroscopy.

(Or)

10 (a) Write an account on Sequence databases.

(Or)

(b) How will you perform sequence alignment?