DHANALAKSHMI SRINIVASANCOLLEGE OF ARTS & SCIENCE FOR WOMEN

(AUTONOMOUS)

Affiliated to Bharathidasan University
(Nationally Re-Accredited with 'A' Grade by NAAC)
PERAMBALUR 621212
(For the candidates admitted from the academic year 2021-2022 onwards)

M.Phil., Program Outcome-PO

PO-1 Obtain hands-on experience in laboratory techniques and handling , maintenance of research lab.
PO-2 Practice the teaching-learning process by being the proponent in classroom and laboratory experience.
PO-3 Motivate themselves in developing an interest on designing and implementation of research.
PO-4 Be familiar with and think critically towards the science curricula with comprehensive knowledge and theoretical skills.
PO-5 List opportunities in reputed companies, research institutions for higher education towards teaching and research

M. Vasanthy
Dr.M.Vasanthy Nachiappan
(University Representative)
Assistant Professor in Environmental Biotechnology ,
Bharathidasan University, Trichy

Mr. G. Jayakumar,
(Industrialist)
Deputy Manager Environmental
A.R. Dairy Food Pvt.Ltd.
10/5C, Madurai road,
Begampur (PO).

Dr.K.S. Jayachandran,
(Subject Expert),
Assistant Professor in Bioinformatics,
Bharathidasan University Trichy.

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M.Phil., BIOTECHNOLOGY -COURSE STRUCTURE UNDER CBCS

SEM	PART	COURSE	SUBJECT TITLE	SUBJECT CODE	Prs	Credit	Exam hrs	Marks		Total
								Int	Ext	
I	I	COURSE -I	Research methodology	20MPBT1C1	5	5	3	25	75	100
	II	COURSE -II	Analytical methods	20MPBT1C2	5	5	3	25	75	100
	III	COURSE -III	Paper on topic of research	20MPBT1C3	5	5	3	25	75	100
	IV	COURSE -IV	Teaching and learning skills	20MPBT1C4	5	5	3	25	75	100
II			Dissertation and viva - voce	20MPBT2PW		20		25	75	100
TOTAL CREDIT						40				500

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CORE COURSE I
RESEARCH METHODOLOGY

Semester: I | Max mark: 100(Int:25,Ext:75)
Course code: 20MPBT1C1 | Credit:5
Total Periods : 75 | Exam hrs : 3

OBJECTIVES:

To present the study about the scientific research and how to write the papers and to give the knowledge about bioinformatics, biostatistics and issues related to bioethics and patening.

UNIT-I SCIENTIFIC RESEARCH **15**

Importance and need for research ethics and scientific research. Formulation of hypothesis. Types and characteristic – designing a research work.

UNIT-II SCIENTIFIC WRITING **15**

Scientific Writing Characteristics. Logical format for writing thesis and papers. Essential features of abstract, introduction, review of literature, materials and methods, and discussion. Effective illustration- tables and figures. Reference styles-Harvard and Vancouver systems.

UNIT-III BIOINFORMATICS **15**

The scope of bioinformatics. The internet. The World Wide Web. File transfer protocol. Useful search engines. The entrez system, File formats. Biological databases. Sequence and structure, NCBI, Data retrieval. Searching sequence database. Sequence similarity searches, amino acid substitution matrices. Database search-FASTA and BLAST, Protein multiple sequence alignments, CLUSTAL.

UNIT-IV BIOSTATISTICS **15**

Collection and classification of data – diagrammatic and graphic representation of data-measurement of central tendency- standard deviation – normal distribution – Test of significance based on large samples – small samples – Student test-correlation and regression – Chi square test for independence of attributes – ANOVA.

UNIT V BIOETHICS AND PATENTING **15**

Declaration of Bologna. Ethics in animal experimentation. CPCSEA guidelines – Animal care and technical personnel environment. Animal husbandry, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia.

Composition of(Human) Institutional Ethical Committee (ICE) – General ethical issues. Specific principles for clinical evaluation of drugs, herbal remedies and human genetics research. Ethics in food and drug safety. Environmental release of microorganisms and genetically engineered organisms. Ethical issues in human gene therapy and human cloning.

Patenting – definition of patent. Product and process patents. Patenting multicellular organisms. Patenting and fundamental research.

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REFERENCE:

1. R.A.Day. How to write a scientific paper. Cambridge University Press.
2. Cooray P.G. Guide to scientific and technical writing.
3. Carter V Good and Douglas E seats Methods of Research.
4. Alley, Michael. The craft of scientific writing. Englewood Cliffs. N.N. prentic 1987.
5. M.C. Sharma, Desk Top Publishing on PC, BPB Publications, 1997.
6. Lesk, A.M. Introduction to Bioinformatics Oxford 2002.
7. Krane et al Fundamental concepts of bioinformatics Benjamin Cummings.
8. Sundar Rao, Jesudian Richard – An introduction to Biostatistics.
9. S.P. Gupta – Fundamentals of statistics, Sultan Chand.
10. Ethics and the use of alternatives to animals in research and education. Shirance Pereira. CPCSEA.
11. CPCSEA guidelines for laboratory animal facility (CPCSEA) – No. 13 Seaward road, Valmiki Nagar Chennai-41.
12. Ethical guidelines for biomedical research on human subjects. ICMR, New Delhi, 2000.
13. Dickson. Molecular and cell biology of human gene therapeutics. Series Chapman and Hall 1995.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
COl	Students can understand the Importance and need for research ethics and scientific research.	K2 & K3
CO2	Students can understand the Scientific Writing of research papers	Kl, K2 & K3
CO3	Students can understand the scope of bioinformatics	K2 ,K3 &K4
CO4	Students can understand Collection and classification of scientific data	K2& K3
CO5	Students can understand the bioethics and patenting	K2, K3 & K5

Note.Kl-Remembering,K2 —Understanding; K3 —Applying, K4 —Analyzing; K5 — Evaluating, K6-Creating

Mapping with Programme outcome —

Course outcome	PO1	PO2	PO3	PO4	PO5
COl	L	M	S	S	M
CO2	M	S	S	S	S
CO3	M	M	L	M	M
CO4	M	S	S	M	M
CO5	L	L	M	L	L

Indicators: 1. Strong 2. Medium 3.Low

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CORE COURSE II

ANALYTICAL METHODS

Semester: I | Max mark: 100(Int:25,Ext:75)
Course code: 20MPBT1C2 | Credit:5
Total Periods: 75 | Exam hrs : 3

OBJECTIVES:

To present the study about the techniques like chromatography, microscopy, Spectroscopy and immunological techniques.

UNIT – I CHROMATOGRAPHY 15

Chromatography: Performance parameters (retention time, elution volume, capacity factor, plate height, and resolution). Low pressure liquid chromatography (LPLC)- principle, columns, matrix materials, procedure. HPLC-columns, matrix, mobile and stationary phases, sample application, pumps, detectors. HPTLC- principle, procedure, applications. Fast protein liquid chromatography. Reversed phase chromatography.

UNIT – II MICROSCOPY AND CELL CULTURE TECHNIQUES 15

Light microscopy-components, specimen preparation. Optical contrast, specimen stains. Fluorescence microscopy, fluorophores. Optical sectioning- confocal microscopes, multiple photon microscopes. Imaging living cells and tissues. Stereomicroscope. Electron microscopy-principle, specimen preparation for TEM and SEM. Cell culture techniques: Equipment- hoods, CO2 incubator. Safety considerations, aseptic techniques, eradication of infections. Animal cell cultures- primary cell cultures, cell lines, media and growth requirement, subcultures, cell quantification, cryopreservation, cell viability. Elementary details of bacterial and plant cell cultures.

UNIT – III IMMUNOCHEMICAL TECHNIQUES 15

Antibody labeling: radiolabeling, labeling with fluorochromes and enzymes, biotinylation. Immunoblotting. Immunoassays: competitive binding, immunometric, solid-phase immunobinding, enhanced, peptide-based, fluorescence and photoluminescence-based. Immunohisto/ cytochemistry. Immunofluorescence techniques. Immunoelectron microscopy. Chromatin immunoprecipitation. Flow cytometry.

UNIT – IV ELECTROPHORETIC AND SPECTROSCOPY TECHNIQUES 15

Electrophoresis of proteins- SDS-PAGE, isoelectric focusing, 2D-PAGE. Detection, estimation and recovery of proteins in gels. Electrophoresis of nucleic acids: agarose gel electrophoresis, DNA sequencing gels, pulsed field gel electrophoresis. Electrophoretic mobility shift assay. Southern, Northern and Western blotting. Basic principle and biological applications of IR, NMR and ESR. Mass spectrometry-

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principle, instrumentation, ionization, mass analyzers, MALDI-TOF and tandem mass spectrometry (elementary details only).

UNIT – V MOLECULAR BIOLOGY TECHNIQUES 15

Probe preparation: end labeling, random primer labeling, nick translation, molecular beacon-based probes. RFLP, DNA fingerprinting, FISH. PCR-principle and applications. RT-PCR. Real-time quantitative PCR, differential display PCR, allele-specific oligonucleotide PCR. DNA sequencing chemical and enzymatic methods, automated fluorescence method, pyrosequencing, cycle sequencing. DNA and protein microarrays- fabrication and applications.

REFERENCE:

1. Wilson and Walker. Principles and techniques of Biochemistry and Molecular biology. 6th ed. Cambridge University Press 2005.
2. Boyer, R. Modern Experimental Biochemistry. 3rd ed. Addison Weslery Longman, 2000. 3
. Sambrook. Molecular Cloning. Cold Spring Harbor Laboratory, 2001.
4. Friefelder and Friefelder. Physical Biochemistry- Applications to Biochemistry and Molecular Biology. WH Freeman & Co. 1994.
5. Upadhyay, Upadhyay and Nath. Biophysical Chemistry Principles and Techniques. Himalaya.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
COl	Students can understand the Chromatography techniques	K2 & K3
CO2	Students can understand the microscopy and cell culture techniques	Kl, K2 & K3
CO3	Students can understand the immunochemical techniques	K2 ,K3 &K4
CO4	Students can understand electrophoretic and spectroscopy techniques	K2& K3
CO5	Students can understand the molecular biology techniques	K2& K3

Note.Kl-Remembering,K2 —Understanding; K3 —Applying, K4 —Analyzing; K5 — Evaluating, K6-Creating

Mapping with Programme outcome —

Course outcome	PO1	PO2	PO3	PO4	PO5
COl	S	M	S	S	M
CO2	L	S	S	S	S
CO3	M	M	L	M	M
CO4	M	S	S	M	M
CO5	S	S	M	L	L

Indicators: 1. Strong 2. Medium 3.Low

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