SYLLABUS

M.Phil- BIOTECHNOLOGY

2017-18

Since 1951

PG & Research Department of Biotechnology
JAMAL MOHAMED COLLEGE (Autonomous)
College with Potential for Excellence
Reaccredited (3rd Cycle) with 'A' Grade by NAAC
(Affiliated to Bharathidasan University)
Tiruchirappalli – 620 020.

Master of Philosophy (M.Phil.) in Biotechnology (2017-2018 Onwards)

SEM	SUB CODE	COURSE	SUBJECT TITLE	HRS / WEEK	CREDIT	CIA Mark	SE MARK	TOTAL MARK
I	17MPBT 1C1	CORE I	Research Methodology	4*	4	40	60	100
	17MPBT 1C2	CORE II	Modern Biotechnology	4*	4	40	60	100
	17MPBT1C3	CORE III	Guide Paper	4*	4	40	60	100
	17MPBT 1C4	CORE IV	Teaching and Learning Methodology	4*	4	40	60	100
	*One hour library for each course							
	TOTAL			16	16	160	240	400
II	17MPBT 2PW	Project Work	Dissertation**	-	8	-	-	200
GRAND TOTAL				**-**	**24**	**-**	**-**	**600**

** Evaluation of the Dissertation and Viva Voce shall be made jointly by the Research Supervisor and the External Examiner.

SEMESTER I: CORE-I

RESEARCH METHODOLOGY

Subject code: 17MPBT1C1 **Max Marks: 100**
Hrs/Week: 4 **Internal Marks: 40**
Credit: 4 **External Marks: 60**

Objectives: *To understand the working principles, construction and applications of the instruments often used in the studies related to various disciplines of Biological Sciences and to understand the importance and the concept of Research and learn the techniques of paper writing and publication.*

Unit-I

Selection of a research problem- experimental approach and research design, library and research documentation- literature review- sources of information- technical papers- peer reviewed journals-e-journals- citation index- impact factor- H-index - reference collection from internet- index card and arrangement of reference collected, Thesis writing- components of a thesis, preparation of research documents (abstracts, papers etc).#Thrust areas and research priorities in biotechnology at National and International levels#. Planning of research: Research proposals, time scheduling of research, available sources and generation of funds and facilities. **12 Hours**

Unit- II

Principles and applications of confocal microscope.Separation Techniques - Principles and application of thin layer chromatography,gel exclusion chromatography, ion exchange chromatography, affinity chromatography, Gas chromatography, high performance liquid chromatography and reverse phase chromatography. #Principles and applications of UV-Vis-FTIR-NMR-Mass spectroscopy, X – Ray Diffraction (XRD)#. **12 Hours**

Unit –III

Principles and applications of SDS- PAGE, 2D- gel electrophoresis, MALD1-TOF, gel documentation, Immunoelectrophoresis, Immunodiffusion, Immunoprecipitation – agglutination techniques. #Southern, Northern and Western blotting techniques, Molecular techniques - PCR, RFLP, RAPD, AFLP, DNA finger printing and DNA sequencing#. **12 Hours**

Unit – IV

Introduction to IPR, Types of IP - Patents, Trademarks, Copyright and Related Rights, Industrial Design, Traditional Knowledge and Geographical Indications. Importance of IPR – patentable and non patentables, patenting life, legal protection of Biotechnological inventions. Objectives of the patent system - Basic, principles and general requirements of patent law.#Biotechnological inventions and patent law - Legal development - Patentable subjects and protection in Biotechnology.Introduction to ethics and bioethics#.Ethical limits of Animal use.

12 Hours

Unit –V

Principles and practice of statistical methods in biotechnological research; collection and tabulation of data; graphical and diagrammatic representation of data; basic statistics; Simple Correlation and regression analyses; significance tests: Chi- square test, student's t-test, ANOVA, Duncan's Multiple Range Test. #Bioinformatics: BLAST N and P, Gene discovery using EST#. Genbank Database- NCBI, EMBL and DDBJ. Protein sequence Database- Swiss Prot and PDB.

12 Hours

#Self-study portion

Text Bookss:

1. Anderson, J; Durston,D and Poole, M. Thesis and Assignment writing. New Age International Pvt. Ltd, New Delhi.(1991).
2. David Freifelder and W.H.Freeman. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (August 15,). - 2nd Edition and Co Ltd.(1982)
3. Gurdeep R Chatwal, Sham K Anand,. Instrumental methods of chemical analysis 2nd Edition; Himalaya Publishing House.(2007)
4. Jerrold H. Zar,.Biostatistical Analysis (4th edition), Prentice Hall publishers.(1998)
5. Prem S. Mann,. Introductory Statistics.FifthEdition.John Wiley and Sons (ASIA) Pvt. Ltd.(2004)

   UNIT 1- CHAPTER 1, 3- T.B. 2
   UNIT 2- CHAPTER 4- T.B. 2
   UNIT 3- CHAPTER2, 3- T.B .3
   UNIT 4- CHAPTER 5- T.B. 4
   UNIT 5- CHAPTER1, 4- T.B. 1

Books for References:

1. Veer BalaRastogi.,. Fundamentals of Biostatistics, Ane Books India, New Delhi. (2006)
2. Veerakumar, L., Bioinstrumentation, MJP Publishers, Chennai. (2006).
3. Washington, D.C., Conference of Biological Editors Style manual for Biological Journals, American Institute of Biological Science. (2000).
4. Wilson, K and Walker.J, Principles and techniques of practical- Biochemistry. (5th Edition), Cambridge University Press.(1999).

SEMESTER I : CORE-II
MODERN BIOTECHNOLOGY

Subject code: 17MPBT1C2 **Max Marks: 100**
Hrs/Week: 4 **Internal Marks: 40**
Credit: 4 **External Marks: 60**

Objectives: *To understand the basic structure and functioning of the genetic system and to understand the molecular basis.*

Unit – I

Fundamentals of Biotechnology: Molecular Biotechnology Revolution, Emergence and Commercialization of Molecular Biotechnology, Concerns and Consequences, Prokaryotic and Eukaryotic Organisms, *E.coli, Saccharomyces cerevisiae*, #Secretion pathways in prokaryotic and Eukaryotic organisms#, Eukaryotic cells in culture. **12 Hours**

Unit II

Human Genetics: Modes of human inheritance, Genetic linkage and gene mapping, Comprehensive human linkage maps, Radiation Hybrid mapping, Human genome sequence, #Determining gene function- Functional gene cloning#, Positional candidate gene cloning,cDNA Microarray, Two hybrid system. **12 Hours**

Unit –III

Protein Engineering:AddingDisulfideBonds – T4 Lysozyme, Xylanase, Human Pancreatic ribonuclease. Changing Asparagine to other amino acids, Reducing the number of free sulfhydryl residues, Modifying metal cofactor requirements, Decreasing protease sensitivity, #Modifying protein specificity, Antibodies, Altering multiple properties - Subtilisin, peroxidase#. **12 Hours**

Unit IV

Regulating the use of Biotechnology: Regulating the use of Biotechnology, Regulating Recombinant DNA Technology – Regulating Food and Food ingredients – Chymosin, Tryptophan, Bovine Somatotropin; Deliberate Releases of GMOs.#Development of a policy for somatic cell gene therapy, Accumulation of Defective genes in future generations, Human germ line gene therapy#.

12 Hours

Unit – V

Stem cells and Nanobiotechnology: Stem Cells – types- Gene therapy. Cloning of animals. Stem cell therapy – reproductive cloning. Nanobiotechnology – self-assembly, Molecular motors. Biologically inspired nanotechnology – single molecule assays, atomic force microscopy, optical Tweezers, The good side of the viruses: Natures Nanotechnology.# Design issues of nanobiologicaldivises – imaging using nanotherapeutic contrast agents, magnetic resonance imaging (MRI), Nanoparticle contrast agents, nanobiotechnological contrast agent design#.Nanomedicineemerging area in nanobiotechnology.

12 Hours

#Self-study portion

Text Books:

1. Allison LA., Fundamental Molecular Biology. John Wiley and Sons.(2007).
2. Ashok K. Chauhan and AjitVarma, I.K. International Publishing House Pvt. Ltd. New Delhi.(2009).
3. Bernard R.Glick, Jack, Pasternak Molecular Biotechnology. ASM Press.(2010).
4. Ian Freshney, Culture of Animal cells, 3rd Edition, John Wiley & Sons, Inc. publications.(2007).
5. James D.Watson, Michael Gilman, Jan A. Witrowski, Mark Zoller.An Overview of recombinant DNA technology and surveys advances in recombinant molecular genetics, Experimental methods and their results. W.H. Freeman.(1992)

UNIT1- CHAPTER 2, 6- T.B-3
UNIT2- CHAPTER 4- T.B -3
UNIT3 – CHAPTER3- T.B-2
UNIT4- CHAPTER 1- T.B-5
UNIT5- CHAPTER9- T.B-2

Books for References:

6. James D.Watson. Molecular Biology of the gene. Pearson Education India.(1976).
7. Jin Xions. Essential Bioinformatics. Cambridge University Press. (1998).
8. William S.Klug, Michael R.Cummings. Concepts of genetics. Pearson Education India.(1986).
9. Wink M., An introduction to Molecular Biotechnology. John Wiley and Sons.(2006).

SEMESTER I: CORE-IV

TEACHING AND LEARNING METHODOLOGY

Subject code: 17MPBT1C4 **Max Marks: 100**
Hrs/Week: 4 **Internal Mark: 40**
Credit: 4 **External Mark: 60**

Objectives: To understand and study the modern method of teaching and learning technique.

Unit – I

Computer application skills: Internet –meaning – importance-types of networking-LAN, WAN, MAN-internet- website and webpage's, internet connectively – Browsing the internet-Browsing software-URL addresses, search engines, exploring websites and downloading materials from websites, power point-creating a presentation – slide preparation-#popular websites for data collection in Biotechnology, MS Excel- Statistical packages# –SPSS.

12 Hours

Unit – II

Communication and Interaction: The theory of communication-communication cycle-Types of communication, communication and language, communication in the class room, Lecture and Lecture demonstration as communication. Interaction methods –Interaction analysis, observation schedule and record.#Bale's interaction process categories – Flander's system of interaction analysis – verbal interaction category system#.Reciprocal category system – Equivalent talk categories.

12 Hours

Unit – III

Education skill: Psychology – Definition-Nature- Meaning of educational Psychology – Definition – Nature – Scope. Teaching and learning – meaning – characteristics – effective teaching – concept of learning – comparison between teaching and learning.#Mental health –Frustration – concept of adjustment – Defence mechanism – Mental hygiene#. **12 Hours**

Unit – IV

Uses of teaching strategies: Group methods of instruction – lecture – demonstration – seminars – workshops – case analysis – panel discussion – team teaching - individual approaches – Teleconferencing – Video conferencing – Description – Advantages – #Micro teaching – Characteristics of Micro teaching – Teaching skills – Programmed Instruction – ICT enabled teaching – Language Laboratory#. **12 Hours**

Unit – V

Educational Technology: Educational technology – definition – objectives – teaching technology – characteristics of teaching technology – behavioural technology – pedagogy of teaching – General advantage of using teaching aids – Broad classification of teaching aids – #Hardware and software in teaching aids#. Instructional media – media attribution – multimedia and instructional development – Multimedia centre – uses and abuses of multimedia. **12 Hours**

#Self-study portion

Text Books:

1. Kochhar S.K., Methods and Techniques of Teaching Sterling Publisher Pvt. Ltd.(2004).
2. Robinson S., Fundamentals of Education Psychology 2nd ed., Ane Books Pvt. Ltd.(2008).
3. SambasivaRao, D. BhaskarRao., Techniques of Teaching Psychology Sonali Publications New Delhi.(2006).
4. Sampath K, A. Pannerselvam and S. Santhanam, Introduction to Educational Technology 4th revised ed., Sterling Publisher Pvt. Ltd.(2000).
5. Sharma R. A., R. Lall., Book Depot Educational technology and management models media and methods, Meerut (UP).(2007).

UNIT1- Chapter 4-T.B.3
UNIT2- Chapter5-T.B.2
UNIT3- Chapter3-T.B.1
UNIT4- Chapter6-T.B 5
UNIT5- Chapter8- T.B 4

Books for References:

1. SrinivasanTM., Use of Computers and Multimedia in Education Aavisakar Publication, Jaipur. (2002).
2. Sundararajan K,. Internet, Kannadhasan Publications, Chennai.(1998).
3. Vanaja, Educational technology Neel Kamal Publication Pvt. Ltd. Hyderabad.(2004).
4. Zikr – urRahman, Modern teaching methods and techniques – Anmol Publication Pvt. Ltd. New Delhi, (2006).