BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024

M.Phil. BIOTECHNOLOGY [FT / PT] Programme

(For the candidates to be admitted from the academic year 2009-2010 onwards)

Semester I	Title of the Course	Marks			Credits
		IA	UE	Total	
Course -I	Research Methodology	40	60	100	4
Course - II	Advances in Biotechnology	40	60	100	4
Course- III	Paper on Topic of Research (Guide will prepare the syllabus and it will be sent to the COE)	40	60	100	4
Course – IV	Teaching and Learning skills (Common Paper)	40	60	100	4
Semester II					
	Dissertation and Viva-Voce Viva Voce 50 marks Dissertation 150 marks			200	8

For each Course other than the Dissertation

Continuous Internal Assessment – 40 Marks
End Semester Examination – 60 Marks

Total – 100 Marks

Question paper pattern for Course I - III

10 questions compulsory 10 x 01 = 10 Marks (2 from each unit)
5 questions 05 x 04 = 20 Marks (either or type, one from each unit)
3 questions from 5 03 x 10 = 30 Marks (one question from each unit)

Total 60 Marks

Question paper pattern for Course IV

5 Questions 05 x 12 = 60 Marks (either or type, one from each unit)

CIA components

Tests (2x10) - 20 Marks
Term Paper – 10 Marks
Seminar - 10 Marks

M.Phil., Biotechnology (2009-10 onwards)

COURSE –I: RESEARCH METHODOLOGY

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- 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.

Unit- II

Principles and applications of atomic force microscope, atomic tunneling microscope, cytophotometry and flow cytometry, X-ray diffraction, NMR, and ESR spectroscopy, Mass Spectrometry, GC Mass Spectra, Micro array technique, gel filtration, ion exchange and affinity chromatography, thin layer and reverse phase chromatography, HPLC, GC.

Unit –III

Priniples and applications of SDS- PAGE, AGE, 2D- gel electrophoresis, gel documentation, Immunoelectrophoresis, Immunodiffusion, Immunoprecipitation – agglutination techniques, RIA. Southern, Northern and Western blotting techniques and hybridization, PCR, RFLP, RAPD, AFLP, DNA finger printing and DNA sequencing

Unit – IV

Databases: DNA and Protein databases, Sequence Analysis and structure visualization softwares Sequence Alignment: Global and local alignments- Similarity searching- principles and algorithms- Pair wise and Multiple alignments; Data base searching methods; Protein structure prediction: secondary and tertiary structure predictions; protein motifs; Proteomic tools at ExPASy server- RNA structure analysis- plasmid mapping and primer designing – prediction of genes, promoters, splice sites and regulatory regions- Genome comparisons, phylogeny analysis, pharmacogenomics.

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. Multivariate Analysis: Basic principles and applications of Multiple regression analysis, Principal Component Analysis (PCA), Discriminant Function Analysis (DFA), Cluster Analysis.

REFERENCES:

1. Anderson,J; Durston,D; Poole,M. Thesis and Assignment writing. New Age International Pvt.Ltd, New Delhi, 1991.

2. Conference of Biological Editors,. Style manual for Biological Journals, American Institute of Biological Science, Washington,D.C, 2000

3. Research Methodology for Biological Sciences, N. Gurumani, MJP publisher. 2007

4. Instrumental methods of chemical analysis – Gurdeep R Chatwal , Sham K Anand, 2nd Edition; Himalaya Publishing House. 2007

5. Principles and techniques of practical- Biochemistry (5th Edition), Wilson.k; Walker.J, Cambridge University Press,. 1999..

6. Bioinformatics: sequence and genome analysis, David W. Mount, 2nd edition, CSHL press, (July 1, 2004)

7. Physical Biochemistry: Applications to Biochemistry and Molecular Biology- Second Edition David Freifelder, W.H.Freeman & Co Ltd (August 15, 1982)

8. Biostatistical Analysis (4th edition) Jerrold H. Zar, Prentice Hall publishers, (October 18, 1998)

9. Fundamentals of Biostatistics, Veer Bala Rastogi, Ane Books India, New Delhi. 2006.
10. Bioinstrumentation, Veerakumar, L., MJP Publishers, Chennai. 2006.

COURSE II- ADVANCES IN BIOTECHNOLOGY

Unit I:Plant Biotechnology

In-vitro regeneration protocols amenable for gene transfer, Vectors used in gene transfer in plants. Ti plasmids,Biolistic gun. Antisense and RNAi strategies for metaboloic engineering .Transgenic crops for herbicide ,pest and abiotic stress resistance.Terminator gene technology. Biosafety issues, IPR and Bioethics.

Unit – II:Animal Biotechnology

Different cell culture techniques ; Development of cell lines; Characterization and maintenance of cell lines; cryopreservation, Cell cloning and selection; transfection and transformation of cells; Application of animal cell culture for in vitro testing of drugs; Applications of cell culture technology in production of human and animal viral vaccines. Transgenic animal models: gene knock-outs; Cre-lox systems-applications.

Unit – III:Medical Biotechnology

Human health care, genetic disorder, gene therapy, Infectious diseases, DNA-based disease diagnosis, Stem cell biology: stem cell types- haematopoietic and embryonic- chord blood cells- regenerative medicines. Production of Bioactive Compounds, Drug delivery, Development of recombinant vaccines, Herbal medicine.

Unit – IV: Industrial Biotechnology

Production of enzymes & organic acids, Downstream processing, Solid state fermentation, Bioprocess monitoring, modeling and control, Biocatalysis & Biotransformation, Bioconversion of biomass, Biosensors, Biofuel- bioethanol and biohydrogen, Biopolymers. Principles and applications of Nanobiotechnology.

Unit – V:Environmental Biotechnology

Global environmental issues and biotechnological solutions. Treatment of industrial effluents- solid waste management- Management of nuclear waste. Bioremediation- *in situ* and *ex situ* bioremediation. Biodegradation of xenobiotics. Biomonitoring . Biodiversity conservation.

REFERENCES:

1. Slater,A. Scot,N. and Fowler,M. (2007) Plant Biotechnology-the genetic manipulation of plants. Oxford press,

2. Watson,J.D; Gilman,M; Witkowshi,J and M.Zoller, 1992. Recombinant DNA, 2nd edition. Scientific American Books, W.H. Freeman and Co; New york, USA

3. Glick, B.R and J.J. Pasternak. 2005. Molecular Biotechnology-Principles and application of recombinant DNA, 3rd edition. ASM press. Washington, USA

4. Environmental Biotechnology, principles and applications, Bruce Rittman, Perry Mccarty, McGraw- Hill, 2nd edition, 2000.

5. Therapeutic Immunology, K. Frank Austen, Steven J. Burakoff, Fred.S.Rosen, Terry.B.Storm (2nd edition) 2001.

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COURSE –IV – TEACHING AND LEARNING SKILLS

Objectives:

- acquaint different parts of computer system and their functions
- understand the operations and use of computers and common Accessories
- develop skills of ICT and apply them in teaching learning context and Research
- appreciate the role of ICT in teaching, learning and Research
- acquire the knowledge of communication skill with special reference to its elements, types, development and styles
- understand the terms communication Technology and Computer mediated teaching and develop multimedia / e-content in their respective subject
- understand the communication process through the web
- acquire the knowledge of Instructional Technology and its Applications
- develop different teaching skills for putting the content across to targeted audience

Unit I – Computer Application Skills

Computer system: Characteristics, Parts and their functions – Different generations of Computer – Operation of Computer: switching on / off / restart, Mouse control, Use of key board and some functions of key – Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations

Unit II – Communication Skills

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and written; Non-verbal communication – Intrapersonal, Interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and writing – Methods of developing fluency in oral and written communication – style, Diction and Vocabulary – Classroom communication and dynamics

Unit III – Communication Technology

Communication Technology: Bases, Trends and Developments – Skills of using Communication Technology – Computer Mediated Teaching: Multimedia, E-content – Satellite-based communication: EDUSAT and ETV channels, Communication through web: Audio and Video applications on the Internet, interpersonal communication through the web.

Unit IV – Pedagogy

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation – Versatility of lecture technique – Demonstration, Characteristics, Principles, Planning Implementation and Evaluation – Teaching – Learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion – Models of teaching: CAI, CMI and WBI

Unit V – Teaching Skills

Teaching skill: Definition, Meaning and Nature – Types of Teaching skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills

References:

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
3. Information and Communication Technology in Education: A Curriculum for Schools and programme of Teacher development, Jonathan Anderson and Tom Van Weart, UNESCO, 2002
4. Kumar K.I (2008) Educational Technology, New Age International Publishers, New Delhi
5. Mangal, S.K. (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana
6. Michael D. and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York
7. Pandey S.K. (2005) Teaching Communication, Commonwealth Publishers, New Delhi
8. Ram Babu A. and Dandapani S (2006) Microteaching (Vol.1&2) Neelakamal Publications, Hyderabad
9. Singh V.K. and Sudarshan K.N. (1996) Computer Education, Discovery Publishing Company, New York
10. Sharma R. A. (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
11. Vanaja. M. and Rajasekar S. (2006) Computer Education, Neelkamal Publications, Hyderabad.

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