

SYLLABUS

for

M.Phil. COURSE IN BIOTECHNOLOGY (2020-21)



P.G. Department of Biosciences and Biotechnology

**FAKIR MOHAN UNIVERSITY
Nuapadhi Campus, Balasore-756089**

M. Phil. Course of Studies

The M.Phil. Programme in the Department of Biosciences and Biotechnology consists of two semesters. The course pattern in the two semesters is mentioned below. The pattern of examination will be as per the guide lines on regulation of M. Phil degree under semester system in F.M. University. The department shall follow semesters of teaching and examination based on continuous evaluation by internal as well as by external examiners.

During the second semester, a student shall deliver at least two seminars (BTM-621), which will be evaluated by the factuality members present in the seminar. The students will start their dissertation project in consultation with their supervisor from the begging of the 1st semester, but the thesis will be submitted at the end of second semester. The thesis will be examined by an external examiner and the respective supervisor

	First Semester	
BTM-611	Research Methodology, Statistics and Bioinformatics Applications	4 CH
BTM-612	Elective Paper: Applied Bioscience & Biotechnology	4 CH
BTM-613	Review of Literature	4 CH
	Second Semester	
BTM-621	Journal Paper Discussion and Seminar	2 CH
BTM-622	Project work, Viva-voce and Project Presentation	10 CH
	Grand Total	24 CH

First Semester

BTM-611 Research Methodology, Statistics and Bioinformatics Applications

4CH

UNIT-I

Research Methods: Elements of Scientific Research: Formulation of Research Problem, Framing Hypotheses, Formulation of research objectives, Review of Literature. Research Report: Components, Format of thesis and dissertation, Manuscript/research article, Review article, Bibliography and References, Significance of research, Publishing and ethical issues

UNIT-II

Concept of sample population, sampling and dispersion and randomization. Sampling: Concept and Types - Simple Random, Probability Proportionate to Size, Stratified and Purposive; Sampling and Non-Sampling Errors. Data analysis and interpretation, Diagrams and graphs using Microsoft Excel, Communication and presentation skills, Statistical software-SPSS

UNIT-III

Brief description and tabulation of data and its graphical representation, Measure of central tendency and dispersion; mean, median, mode, range, standard deviation, variance. Idea of two types of errors and level of significance, tests of significance (F, Z and t-test); chi- square tests, Simple linear regression and correlation, ANOVA.

UNIT-IV

Biological Databases: Sequence and structure databases, NCBI, Specialized Databases- KEGG, OMIM. Sequence analysis – Local and Global Alignment, BLAST, Algorithms for alignment, ClustalX2, Phylogenetic Analysis, Secondary structure prediction, Molecular Visualization tool- RasMol, Finding genes in genomes

Reference Books:

1. Statistical Methods – S.P. Gupta
2. Research Methodology, Methods & Techniques – C.R. Kothari
3. Statistics (Theory and Practice) – B.N. Gupta
4. Basic Biostatistics – G.B.N. Chainy, P.K Mohanty and G. Mishra
5. Fundamentals of Biostatistics – Veer Bala Rastogi
6. Bioinformatics: A Practical Guide to the Analysis of Genes & Proteins – Andreas D. Baxevanis, B.F. Francis Ouellette (John Wiley and Sons)
7. Introduction to Bioinformatics – Arthur M. Lesk

Unit- I

Microscopy- Light, phase-contrast, fluorescent, confocal, SEM, TEM. Centrifugation techniques. HPLC, Column chromatography techniques. Electrophoresis: Native-PAGE, SDS-PAGE, Isoelectric focusing and 2D electrophoresis, Agarose gel electrophoresis. Blotting techniques- Southern, Northern, Western. Immunological techniques: ELISA, FACS, Immunohistochemistry. Structure determination of Nucleic Acids and Proteins, X-Ray Crystallography, NMR and ESR Spectroscopy, Protein and Nucleic Acid Sequencing.

Unit-II

Isolation of DNA, Restriction Endonucleases, Restriction mapping, Principles and Applications of PCR, RAPD, RFLP, Nucleic Acid Labeling, Microarrays, Gene Cloning Techniques, Isolation of Plasmid, cloning vectors, properties and types (M- 13, Plasmid vectors, pBR-322, pUC-18 shuttle vector, YAC), Gene library, RNA interference, Genome editing, Expression Library construction and purification of recombinant proteins.

Unit –III

Fermentation- Types of fermenter, strain improvement, media formulation, upstream and downstream processing, production of industrially important enzymes, antibiotics, organic acids, vitamins and amino acids.

Molecular immunodiagnostic methods, Role of Biotechnology in vaccine production, Monoclonal antibodies, Nanotechnology in Molecular Diagnosis, Drug discovery, Stem cell therapy, Ethical issues

Unit – IV

Genetically modified organisms (GMO): Gene transfer in plant and animals (Calcium phosphate method, Microinjection, Agro bacterium inoculation etc), Selection and screening of Transgenic plants and animals, Receptor genes, Genetically modified plants and animals (pest resistant, herbicide resistant plants and transgenic animals), Role of GMO in biodegradation, Intellectual property rights, patenting and Bioethics.

Reference Books:

1. Biochemistry: L. Stryer
2. Biochemistry: Voet and Voet
3. Practical Biochemistry: Wilson Walker
4. Analysis of genes and genomes: Reece
5. Gene VIII: B.Lewin

BTM-613

Review of Literature

4CH

Second Semester

BTM-621 Journal Paper Discussion and Seminar

2 CH

BTM-622 Dissertation, Viva-Voce and Project Presentation

10 CH
