

Awadhesh Pratap Singh University
Rewa (M.P.)

Ph.D. Course Work Structure

BIOTECHNOLOGY



2019-2020

Ph.D. 101	Research Methodology	4	100 (80+20)	55
Ph.D. 102	Review of published research in the Relevant field	3	100	55
Ph.D. 103	Computer applications	3	100 (80+20)	55
Ph.D. 104	Animal and Plant Biotechnology	3	100 (80+20)	55
Ph.D. 105	Comprehensive Viva-Voce	3	100	55
	Total		16 Credits	

Dr. S. S. S.

A.P.S. University, Rewa
Syllabus for Ph.D. Course work 2019-20
Subject: Biotechnology
Paper 1 Research Methodology

Unit-1

- Meaning, objectives and types of research. Scope and significance of Research, historical review, search and research problem, reference and literature search, records and presentation of data, scientific research papers writing, abstracts and other literature, rules for maintaining biosafety in the laboratory, research journal, impact factor and paper citation index. Experimental design. Interpretation and Report Writing.
- Science of sampling, need of sampling, sample size and its determination. Random and non-random sampling.
- Population genetics, hardy-Weinberg law, genotype and allele frequency distribution, genetic drift.

Unit-2

- Analytical & chromatographic methods: Micrometry, gravimetry, chromatography, affinity chromatography, paper and thin layer Chromatography, size exclusion chromatography, HPLC, GLC. Gas chromatography.
- Spectroscopic technique of Analysis, Spectrophotometer- single and double beam. UV Visible spectrophotometry, IR-Spectroscopy, NMR, Mass spectroscopy, Raman spectrophotometer, Atomic Absorption Spectrophotometer, Flame photometer.
- Centrifugation technique, Immunological technique, hniqElectrophoretic technique electrophoresis Sequencing of DNA and Protein, Blotting tecues, pH meter.

Unit-3

- Microbial culture sterilization techniques, Culture media- types and preparation, colony counting techniques.
- Identification and enumeration of microorganisms, Preservation and storage and maintenance of microorganisms.
- DNA Damage analysis, Comet assay, cloning and transformation techniques
- Microscopic study of blood cells, cell organelles, spores etc.
- Animal cell culture technique and ethical issues. Bio safety level.
- Microscopic Technique: Light microscope, compound microscope, Phase-contrast microscope, Electron Microscope: TEM and SEM

Unit-4

- Basic elements and tools of statistical analysis, Measures of central tendencies- mean, mode, median, standard deviation, Planning and execution of survey, Test of significance, students't'-test, chi-square test, correlation and regression analysis. Probability distribution, Analysis of variance- one and two way classification.
- Bioinformatics; Genomics, proteomics, NCBI, Pubmed, BLAST, FASTA.

Dr. S. S.
←

A.P.S. University, Rewa
Syllabus for Ph.D. Course work 2019-20
Subject: Biotechnology
Paper II (Ph.D. 102)
Review of published research in the relevant field

Objective: To learn the preparation of research proposal through review of literature in chosen field of research, will be under-taken under the supervisor or the regular teacher of the centre of course work. at the end of course work the candidate has to submit a brief report on the literature review for evaluation, which will be done by two examiners.

R. Singh

A.P.S. University, Rewa
Syllabus for Ph.D. Course work 2019-20
Subject: Biotechnology
Paper IV Animal and Plant Biotechnology

Unit I:

Mendelian genetics-principles, Human genetics (pedigree analysis, karyotypes and genetic disorder). Nature of Gene Concept, Chemical Nature of Gene, Nucleotide, Genome, Prokaryotes and Eukaryotes Genome. DNA Replication: General features of Chromosomal Replication: and its Enzymology. Transcription in prokaryotes and Eukaryotes: Initiation, elongation and termination. Regulation of gene expression in prokaryotes: Operon concept, induction and Repression, Structure and regulation of lactose, tryptophan operons. Genetic Code: Evidence and properties; Wobble hypothesis; Transcriptional adaptors and amino acyl tRNA synthases. Translation: Successive stages of protein synthesis in prokaryotes and its comparison with eukaryotes. chromosomal aberration. Molecular technique: Electrophoresis of DNA, SDS-PAGE, Blotting, DNA Fingerprinting, Foot-printing, DNA sequencing, Gene mapping, PCR, Sequencing, Genome Mapping .

Unit II:

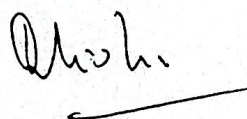
The recombinant DNA Technology: General concept and principle of cloning Enzymes: Nucleases and restriction endonucleases- properties and types; phosphomonoesterases; polymerase; terminal deoxynucleotidyl transferase; poly A polymerase, Linkers, adaptors and homopolymer tailing. prokaryotic host- vector system: Characteristics of E.coli as host; vectors for cloning in E.coli (plasmid, bacteriophage- EMBL, DASH, gt10/11, ZAP etc and plasmid-phage) Other Prokaryotic host vector systems: BAC, Introduction and organization of animal cell and tissue culture laboratory, Primary and established cell line cultures, Serum and protein free defined media and their applications, role of CO₂ and supplements, Stem cell basics , culture and their application. Embryo transfer technology, principles and application

Unit III:

Plant Tissue Culture: Basic aspects of plant biotechnology (History, application, scope and importance), laboratory and culture media for plant tissue culture, cell Culture and its applications. Clonal Propagation and Protoplast Culture: Micro propagation, uses of Haploids, Protoplast isolation, Regeneration of plant, Somatic Hybridization. Gene delivery method in intact and cultured tissues and cells, Agrobacterium, Ti-Plasmid, cointegration and binary vectors, viral vectors, direct DNA uptake, microinjection delivery. Techniques for production of transgenic plants resistant/ tolerant to herbicides; pathogens, pests and abiotic stresses (drought, salt, frost), transgenic plants for production of molecules of commercial importance. Antisense RNA and ribosome technology

Unit IV:

Objectives, roles and landmarks in plant breeding, Plant breeding techniques: Mutational breeding and distant hybridization, Introduction to plant tissue culture: Tissue Culture Media preparation. Initiation of callus culture and its maintenance Generation of genetically modified crops for resistance against biotic and abiotic stresses and nutritional quality, Seed production techniques: release of new varieties, Somaclonal variation and its application for plant improvement Anther culture: haploid and Diploid plant cell production and their applications. Protoplast isolation and fusion, selection of hybrid cell and cybrids.



A.P.S. University, Rewa
Syllabus for Ph.D. Course work 2019-20
Subject: Biotechnology
Paper 3 Computer Application

Unit I

Introduction to computer: History and Generation of computer, Characteristic to computer, Classification: digital, analogue, hybrid, Micro, mini and Super, Components of computer System.

Unit II

Introduction to Operating system: Need, functions, control programs, OS supervisor, Job control programs concurrent, C. S., popular OS for PC's. Introductions to DOS, Internal commands, External commands, (TREE, UNDELTE, CHKDSK, FDISK, FC, BACKUP, RESORE, FORMAT, UNFORMAT, JOIN, XCOPY)

Unit III

Introduction to windows: Program manager, file manager, customizing windows with control panel, print manager. File shearing. Computer languages and machine language Programming in C/C++

Unit IV

Introduction to MS office: The office manager, Starting information with MS office, The clipboard, Word, Excel, Power point. Word processing with word; word basis, Undo, redo, repeat, Insert, text, replace Text, copying form one word document to other. Printing, auto formation, autocorrect. Internet- introduction and application: LAN, WAN, MAN, WWW, Search engines, WiFi, LiFi.

Prakash