REGULATIONS GOVERNING ADD-ON COURSES

P.G. Diploma in Biotechnology

Eligibility:

Degree in any branch of biological sciences with a minimum of 45% of marks in the qualifying degree (for PH/SC/ST a mere pass in the qualifying examination is sufficient) is eligible for admission. Candidates studying regular P.G. courses in the University Departments and fourth or fifth year of integrated courses of the University are also eligible.

Admission: Based on merit considering the marks secured in the qualifying degree examination

Intake: Twenty students

Medium of Instruction: English

Duration of the course: Two Semesters (One Year).

Hours of Instruction: Two hours a day for five days from 5.30 PM to 7.30 PM

Attendance: Minimum 70% of attendance is required for attending the examination.

Maximum duration to complete the course: Two Years

Total credits: Twenty (10 credits / semester)

FEE:

University students and employees

Admission fee: Rs. 200
Tuition fees: Rs. 1,200
Library fee: N/A
Exam fee/semester: Rs. 300

Others

Admission fee: Rs. 500
Tuition fees: Rs. 2,500
Library fee: Rs. 1000*
Exam fee/semester: Rs. 300

*Library fee Rs. 1000/- (Optional for others who desires to use the University Library (for reference only).
# POSTGRADUATE DIPLOMA IN BIOTECHNOLOGY

## COURSE CONTENT AND SYLLABUS

TOTAL CREDITS = 20  
TOTAL HOURS = 320

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<tr>
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<td>PGD BIOT 301</td>
<td>BIOLOGICAL CHEMISTRY</td>
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<td>PGD BIOT 302</td>
<td>MICROBIAL BIOTECHNOLOGY</td>
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<td>PGD BIOT 303</td>
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<td>PGD BIOT 306</td>
<td>RECOMBINANT DNA TECHNOLOGY</td>
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<td>PGD BIOT 307</td>
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<td>PGD BIOT 308</td>
<td>ADVANCED ANIMAL BIOTECHNOLOGY</td>
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<td>BIOTECHNOLOGY LABORATORY II</td>
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UNIT I 6h
Biochemical basis of life. Significance of macromolecules - Carbohydrates, proteins, lipids and nucleic acids.

UNIT II 6h
Carbohydrates - Structure and function of monosaccharides, Oligosaccharides and Polysaccharides; Description and integration of major metabolic pathways.

UNIT III 6h
Lipids - Structure and functions of triglycerides, phospholipids, glycolipids. Significance of PUFA, Cholesterol and its derivatives; Fatty acids metabolism.

UNIT IV 6h
Protein - Structure and properties of amino acids; transamination, oxidative deamination, decarboxylation, disposal of ammonia. Organization of protein structures; Enzyme classification, mechanism, Michealis - Menton kinetics and allosteric enzymes.

UNIT V 6h
Nucleic acids - Structure and function of DNA and RNA; Purine and Pyrimidine base structure, degradation and synthesis, inborn errors of nucleotide metabolism.

TEXT BOOKS


REFERENCE BOOK

UNIT I 6h
History of Microbiology. Microscopy and applications. Microbial diversity – Bacteria, fungi, viruses, protozoa. Microbial nutrition and growth. Microorganisms as factories for the production of novel compounds.

UNIT II 6h

UNIT III 6h
Microbial bioconversion of cellulosic and non-cellulosic wastes. Biopolymers and ioplastics. Bioremediation of wood, fuels, lubricants, rubber, Plastics. Microbiology of degradation of xenobiotics in environment: oil pollution, surfactants, pesticides

UNIT IV 6h
Biological control of insects, bacterial, fungal and Viral diseases. Mode of action of biological control involved in different biocontrol agents. Genetics of antimicrobial metabolite production in biocontrol bacteria.

UNIT V 6h

TEXT BOOKS


REFERENCE BOOKS
1. Prescott and Dunn. Industrial Microbiology. 4th Ed, 1992

UNIT I  
6h
Experiments of Griffith, Avery, Macleod and McCarty, Hershey and Chase, Lederburg and Tatum, Chemical nature of DNA and RNA, Chargaff’s principles, Primary structure of DNA and RNA, Alternative forms of DNA double helices.

UNIT II  
6h
Replicons, DNA replication in Prokaryotes, Enzymes and proteins involved in DNA replication (Nuclease, Polymerases, Ligases, Helicases, Gyrases, SSBP, Replisome / Primosome).

UNIT III  
6h
Transcription in Prokaryotes, RNA Polymerases, Protein factors involved in Initiation, Elongation and Termination of Transcription, structure of tRNA

UNIT IV  
6h

UNIT V  
6h
Regulation of gene expression: operon concept, regulatory gene, operator and promoter regions, lac and trp operons as examples for inducible and repressible operons.

TEXT BOOKS


REFERENCE BOOKS

Unit I 6h
Introduction to the study of Immunology, Historic perspective, Cellular and Humoral mediated immune response. Innate and adaptive immunity, Cells, tissue and organs of immune system

Unit II 6h
Antigens and Immunogenicity. Antigens and Antibodies, B- cell generation and diversity, Immunoglobulins and subtypes of Ig’s, Antigen - Antibody interactions, Cross reactivity, Precipitation and Agglutination reactions

Unit III 6h
Immunological assays - Agglutination tests, Complement fixation tests, Neutralization tests, Immunodiffusion, Immunelectrophoresis, Radioimmunoassays, Immunoblotting and ELISA.

Unit IV 6h
Preparation and purification of Antigens and antibodies, Hybridoma technology and Monoclonal antibodies. Productions of Mab’s in ascites and cell culture. Antibody labeling.

Unit V 6h
Role of Complement in immune response, Hypersensitivity and Different Types of Hypersensitivity, Immunodeficiency, Immunosuppression and Autoimmunity

TEXT BOOKS


REFERENCE BOOKS

1. Absorption spectrum and dissociation constant determination
2. Isolation and estimation of protein by Lowry’s method
3. Purification of enzyme from microbes
4. Antimicrobial susceptibility assays
5. Isolation and estimation of nucleic acids
6. UV-induced mutants and their effect on growth
7. Double diffusion method of immunoelectrophoresis
8. Blood group testing
UNIT I
Cloning Vectors: Plasmids, phages, cosmids, YACs. restriction enzymes, DNA polymerases, reverse transcriptase, ligases, polynucleotide kinase, alkaline phosphatase and nucleases.

UNIT II
Transformation, transduction, electroporation, microinjection. Agrobacterium mediated gene transfer.

UNIT III

UNIT IV
Site-directed mutagenesis, DNA sequencing, design of PCR primers, RT-PCR, RACE, AP-PCR, PAF. Antisense and RNAi technology.

UNIT V
Applications of genetic engineering in medicine, agriculture, veterinary and industry. Safety aspects, Intellectual property rights (IPR) and patents.

TEXT BOOKS


REFERENCE BOOKS

PGD BIOT 307  FERMENTATION TECHNOLOGY  CREDIT-2

UNIT I  6h
Microbial biomass, microbial enzymes, microbial metabolites, recombinant products, transformation processes, Isolation, preservation and improvement of industrially important microbes.

UNIT II  6h
Microbial growth kinetics, Monod model, Batch culture, Continuous culture, multistage system, fed-batch culture, applications of fed-batch culture, sterilisation, medium formulation, rheology.

UNIT III  6h
Probes for monitoring and control of fermentation, aeration and agitation, k_L,a

UNIT IV  6h
Airlift fermentors, stirred fermentors, packed glass bead reactor, anaerobic fermentors.
BOD, COD.

UNIT V  6h
Filteration, centrifugation, two phase aqueous separation, chromatography, ultrafiltration, reverse osmosis.

TEXT BOOKS

REFERENCE
UNIT I 
Animal Cell culture –primary and established cell line cultures, functions of different constituents of culture mediums, serum and protein free media and their applications, Application of animal cell culture. Stem cells and their applications.

UNIT II 

UNIT III 
Integrated insect pest management using biocides, hormone analogues, pheromones and genetic manipulations. Biotechnology of silk worms-Life cycle, culture of silk worm, diseases of silk worm , improvement of silk production and quality, Silk worm as a bioreactor.

UNIT IV 
RFLP and its applications in domestic animals. Biotechnological approaches to vaccine production. Ethical issues in animal biotechnology. Management aspects of biotechnology and genetic engineering

UNIT V 
Biotechnology in animal production-manipulation of growth using hormones and probiotics, manipulation of lactation, manipulation of wool growth in sheep and rabbits

TEXT BOOKS:

REFERENCE BOOKS:
UNIT-1
Plant genome organization and gene structure and function and targeting of proteins to organelles

UNIT-2
Tissue specific expression of storage protein genes, light-mediated genes and heat-shock protein genes.

UNIT-3
Mobile elements – Autonomous and non-autonomous elements, organization and function of maize transposons.

UNIT-4
Structure and function of Ti plasmid of Agrobacterium, plant markers and promoters. Development of plant transformation cassettes.

UNIT-5
Genetic engineering of plants. Tissue culture methods and gene transfer techniques. Transgenic resistance against pests and pathogens. Transgenic plants for delaying of fruit ripening and production of antibodies, antigens and peptides.

Text Books

Reference Book
1. Competent cell preparation and transformation of plasmid DNA
2. Restriction enzyme digestion and cloning of gene
3. Comparison of the product obtained by immobilization of *Lactobacillus subtilis* by using alginate and acrylamide
4. Determination of COD/BOD value of a given solution
5. Silk work rearing- Protein profile of silk gland and haemolymph of larval forms of Silk worm
6. Molecular detection of blue tongue disease in cattle
7. Heterologous expression of plant protein in *Escherichia coli* and analysis of protein by electrophoresis
8. Genetic engineering of plants by *Agrobacterium*-mediated gene transfer using antifungal protein