



Shiv Chhatrapati Shikshan Sanstha's
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)
Department of Biotechnology
Structured Work Plan for Teaching
Academic Year 2019-20 (Term-I)

Details of Classes to be taught

Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc. II	Suraj D. Kadam	Biotechnology	Course Title: Recombinant DNA technology Course Code: U-RET-607 Course Title: Lab Course XVII Course Code: U-LAC-611

1. Summary of Lesson Plan

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Recombinant DNA technology	Unit I 1. Principles of Gene cloning, Molecular tools and their applications: 2. Restriction Endonuclease and their types, 3. DNA Ligases, Alkaline phosphatase. 4. Vectors {Plasmids (pBR322, pUC18/19), Bacteriophages (λ Phage, M 13 Phage) and Cosmids.} 5. Gene cloning strategies- insertion of DNA molecule into a vector (Transformation, Conjugation, Electroporation, Agrobacterium-mediated transformation).	18-06-19 To 13-07-19	01 02 02 01 03 03	Class Seminar	Unit - I 29/07/19
		Unit II 1. r-DNA Techniques. Blotting techniques: Southern Blotting, 2. Northern Blotting, 3. Western Blotting, Dot Blot Blotting,		03 01 02		

		4. Autoradiography. 5. DNA Sequencing: Sanger's and Maxam Gilbert's Method. 6. PCR: Mechanism, Types and Application. 7. DNA chips (Micro array)	14-07-19 To 09-08-19	01 03 02 02	Class Seminar	Unit - II 13/08/19
		Unit III 1. Cosntruction of Genomic library Maniatis Strategy, cDNA cloning with conventional cDNA and full length cDNA.- genomic library. 2. Nucleic Acid Probe, 3. Screening of library- Probe based direct and indirect methods.	10-08-19 To 04-09-19	04 02 04	Class Seminar	Unit - III 29/08/19
		Unit IV 1. Agricultural and Industrial Applications: i) BT-Cotton, ii) Transgenic maize, iii) Goldenrice iv) Protein engineering to Improve Detergent. 2. Enzymes. Pharmaceuatical Applications : i) Recombinant Human Insulin ii)Hepatitis B-vaccineiii) Monoclonal Antibodies iv)Clotting factors v) Tissue Plasminogen Activatorvi) Erythropoietin v) Human growth hormone	05-09-19 To 11-10-19	04 01 04	Class Seminar	

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Recombinant DNA technology	Isolation of Genomic DNA from Bacterial cell.	02/07/19 To 24/10/19 Batch A,B,C,D	04
2		Isolation of Plasmid DNA from resistant clinical isolates.		04
3		Agarose gel electrophoresis and restriction digestion of DNA.		04
4		Ligation of DNA		04
5		Preparation of competent cells and Bacterial transformation		04
6		Screening of recombination by blue white selection.		04
7		Southern blotting		04
8		Western blotting		04
9		PCR amplification of isolated bacterial genomic DNA using universal primers		04
10		Extraction and purification of amplified DNA fragment from gel.		04
11		RFLP and RAPD		04
12		GFP cloning		04
13		Visit to Molecular Biology & Genetic Engineering Research Laboratory		04



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Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
2	M.Sc. II	Suraj D. Kadam	Biotechnology	Course Title: Biochemistry Course Code: P-BIO-135 Course Title: Lab course II Course Code: P-LAC-139

1. Summary of Lesson Plan

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Biochemistry	Unit I 1. Structure of atom, Molecules, weak interaction stabilizing biomolecules, 2. Henderson Hasselbach equation 3. pH, pK, buffers. Thermodynamics principles energy rich bond.	18-06-19 To 10-07-19	01 02 01 01		Unit - I 30/07/19
		UNIT III 1. Nucleosides, nucleotides, Polynucleotide, 2. DNA and its different forms [A, B, C, D, E and Z], 3. RNA and its types. Chargoffs rule, 4. Forces stabilizing nucleic acid structure. 5. Properties of nucleic acid-denaturation and	11-07-19 To 10-08-19	03 03 02 01 04	Group Discussion	

		renaturation, hyperchromism 6. Amino acids: Structure and classification. Properties of amino acids-colour reactions, Zwitterions				
		Unit II 1. Lipids: Introduction, 2. Classes, Fatty acids [Physical properties and Chemical properties- 3. Sap value, acid value, iodine number, rancidity]. 4. Glycerolipid, Sphingolipid, cholesterol.	11-08-19 To 31-08-19	04 03		
		Unit IV 1. Protein structure: Conformation of proteins (primary, secondary, super secondary, Tertiary and quaternary domains) 2. Peptide bond, 3. Forces stabilizing 4. secondary structure, 5. Ramachandran plot, examples of quaternary structure.	01-09-19 To 20-09-19	04 04 02		
		Unit V 1. Enzymes: Basic concept, active site, energy of activation. 2. Transition state hypothesis, 3. Lock and key hypothesis, induced fit hypothesis. 4. Enzyme classification. Co-enzymes: Thiamine, riboflavin.	21-09-19 To 10-10-19	02 02 02 04		

Sr. No.	Practicals	Date	No. of Practicals
1	Introduction to measurements: balances and pipetting. Preparation of solutions of given normality and its standardization.	01/07/190 to 24/10/19 Batch A and B	02
2	PH meter: buffering capacity of a buffer, Indicators. To determine the pKa value and hence the dissociation constant of a given acid by using pH meter.		02
3	Colorimetry: To determine the dissociation constant of a given indicator colorimetrically and to prepare the buffer solutions in the pH range of 2.2 to 8.0		02
4	Thin layer chromatography: lipids, mixture of dyes		02
5	Spectrophotometry: Double beam and recording Spectrophotometry, Derivatives and difference spectra: Indicators, cytochromes, haemoglobin.		02
6	spectrophotometer: Estimation of protein by Lowry, Biuret and Bradford methods, Analysis of Standard curves,		02
7	Enzyme assays Invertase, time, temperature, and cofactors. Km and Vmax, Various kinetic plots.		02
8	Polyacrylamide gel electrophoresis: Native gel.		02
9	SDS-PAGE of proteins.		02
10	column chromatography.		02


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Details of Classes to be taught


Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc. III	Suraj D. Kadam	Biotechnology	Course Title: Pharmaceutical Biotechnology Course Code: U-PHB-706 Course Title: Lab Course XXII Course Code: U-LAC-710

1. Summary of Lesson Plan


Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Pharmaceutical Biotechnology	Unit I: Drug Development in Pharmaceutical Process - Production of pharmaceuticals by genetically engineered cells (hormones, interferons) -Microbial transformation for production of important pharmaceuticals (steroids and semi-synthetic antibiotics) -Techniques for development of new generation antibiotics	10-12-19 To 03-01-20	05 03 03	Classroom Group Discussion	Unit - I 15/02/20
		Unit II: Antibodies in research, diagnostics and therapeutics Production of monoclonal antibodies and techniques to make them clinically applicable Gene therapy -	04-01-20 To 22-01-20	04 02		

		background, types of gene therapy (ex vivo & in vivo) Vaccines -Vaccine vectors, nucleic acid vaccines, immuno-enhancing technology. Toxicogenomics		03 02 02		
		Unit III: Delivery of Biotechnology products: transdermal, parenteral, oral, mucosal, ocular, buccal, rectal and pulmonary delivery Tissue Engineering -Skin, Liver, Pancreas, Xenotransplantation - terminology, technology behind it, organ donors, social & ethical issues Stability of Biotechnology products: Physical instability-denaturation, aggregation, adsorption; Chemical instability-oxidation, hydrolysis	23-01-20 To 10-02-20	04 01 02 03 03		Unit - II 29/08/19
		Unit IV: Diagnosis and Kit Development -Use of enzymes in clinical diagnosis -Use of biosensors for rapid clinical analysis - Diagnostic kit development for microanalysis Products of Biotechnology-current FDA approved biotechnology: drugs-human insulin, growth hormone, interferon; Future biotechnology drugs	11-02-20 To 25-03-20	03 02 03	Class Seminar	

Sr. No.	Subject	Practical's	Date	No. of Practical's
1	Pharmaceutical Biotechnology	1. Assay of antimicrobial activity of Penicillin, Chloramphenicol, streptomycin and Quinolones	16/12/19 To 31/03/20 Batch A,B,C,D	04
2		Determination of Minimum Inhibitory Concentration (MIC) of Antibiotic		04
3		Extraction of natural molecules		04
4		Stability of drugs using spectrophotometry		04
5		Determination of shelf life of antibiotics (Expired drugs)		04
6		Sterility testing of commercial pharmaceuticals.		04
7		Sterility testing of injectable as per IP.		04
8		Effect of chemical disinfectants on growth of bacteria		04
9		Study of microbial spoilage of pharmaceuticals.		04
10		Visit to Pharmaceutical industry		04


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Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
2	M.Sc. I	Suraj D. Kadam	Biotechnology	Course Title: Molecular Biology Course Code: P-MOB-232 Course Title: Lab Course V Course Code: P-LAC-236


1. Summary of Lesson Plan

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Molecular Biology	Unit I Genome organization: Genome organization of Prokaryotes-Bacteria and virus system. Genome organization of Eukaryotes- Structure and types of chromosome, chromatin and nucleosome, Variation in chromosome number, Concepts of ploidy, conditions and types of ploidy, variation in chromosome structure, Denaturation and Renaturation DNA, complex DNA structures, C-value paradox, Cot curve.	10-12-19 To 04-01-20	02 01 02 01 02 02 01	Classroom Group Discussion	Unit - I 19/02/20
		Unit 2 Genome replication: DNA as genetic material, Genome Replication in prokaryote, various modes of DNA replication, enzymes involved, Initiation elongation and termination, & Eukaryotic organisms, Replication regulation in Eukaryotic, enzymes involved, Molecular basis of genome	05-01-20 To 24-01-20	02 02 03 03		

		evolution: Mutations, causes types and effects, Hyper mutation, DNA Repair, Recombination: homologous, site specific, transposition.		03		
		Unit 3 Transcription: Initiation, elongation and termination, Post transcriptional processing of m-RNA, t-RNA, r-RNA, RNA Stability & Half-life period. Translation: Initiation, elongation and termination, Post translational modifications of proteins-Chemical modification, intron splicing, and protein folding and protein localization. Gene regulation in prokaryotes:- Operon concept, Lactose, Tryptophan and Arabinose. Role of cAMP and CRP in lac operon, tryptophan operon, Catabolite repression Gene regulation in eukaryotes: -Conserved mechanism, activation and repressor role in gene regulation. Gene silencing, Signal integration.	25-01-20 To 13-02-20	04 01 02 02 03 05		Unit – II 29/08/19
		Unit 4 1. Basic concepts of developmental biology (molecular insight): -Zygote formation, Embryogenesis, organogenesis and morphogenesis. Study of molecular development of Drosophila, gene regulation. Molecular development of Arabidopsis as model organisms, Homeobox-gene expression, Role of RNAi in development	14-02-20 To 26-03-20	03 02 03 03	Class Seminar	

Sr. No.	Subject	Practical's	Date	No. of Practical's
1	Molecular Biology	Genetic recombination (conjugation, transformation, transduction) in bacteria.	16/12/19 To 31/03/20 Batch A and B	02
2		Isolation of genomic DNA from bacteria, animal and plant cells.		02
3		Isolation of plasmid DNA by using alkaline lysis method.		02
4		Agarose gel electrophoresis by using DNA markers for molecular wt. determination.		02
5		Isolation of antibiotic resistant bacteria by gradient plate method.		02
6		Replica plating for transfer of bacterial colony		02
7		Study of Hens embryo for developmental stage study.		02
8		Study of in vitro transcription and translation		02
9		Study of mutations, Ames test		02
10		In vitro transcription and translate		02
11		Isolation of RNAs		


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