



**Shiv Chhatrapati Shikshan Sanstha's
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)**

**Department of Biotechnology
Structured Work Plan for Teaching
Academic Year 2018-19 (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).	18-06-18 To 15-07-18	01 02 02 01 03 03 03	Class Seminar	Unit – I 25/07/18
		Unit II 1. r-DNA Techniques. Blotting techniques: Southern Blotting, 2. Northern Blotting,		03 01		

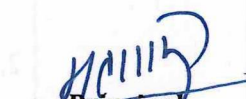
		3. Western Blotting, Dot Blot Blotting, 4. Autoradiography. 5. DNA Sequencing: Sanger's and Maxam Gilbert's Method. 6. PCR: Mechanism, Types and Application. 7. DNA chips (Micro array)	16-07-18 To 10-08-18	02 01 03 02 02	Class Seminar	Unit - II 20/08/18
		Unit III 1. Construction of Genomic library Maniatis 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.	12-08-18 To 06-09-18	02 02 04	Class Seminar	Unit - III 29/08/18
		Unit IV 1. Agricultural and Industrial Applications: i) BT-Cotton, ii) Transgenic maize, iii) Golden rice iv) Protein engineering to Improve Detergent. 2. Enzymes. Pharmaceutical Applications : i) Recombinant Human Insulin ii) Hepatitis B-vaccinia) Monoclonal Antibodies iv) Clotting factors v) Tissue Plasminogen Activator VI) Erythropoietin v) Human growth hormone	07-09-18 To 11-10-18	04 04	Class Seminar	

		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.	11-08-18 To 31-08-18	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.	01-09-18 To 20-09-18	05 05		
		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.	19-09-18 To 09-10-18	02 02 03 04		

Sr. No.	Practical's	Date	No. of Practicals
1	Introduction to measurements: balances and pipetting. Preparation of solutions of given normality and its standardization.	02/07/18 to 22/10/18 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


Course Teacher


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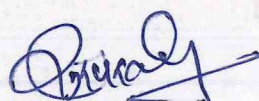
Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
2	M.Sc. II	Suraj D. Kadam	Biotechnology	Course Title: Biochemistry Course Code: P-BIO-135 Course Title: Lab course II Course Code: P-LAC-139


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.	18-06-18 To 12-07-18	01 01 01 01 02	Classroom Group Discussion	Unit - I 30/07/18
		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 renaturation, hyperchromism 6. Amino acids: Structure and classification. Properties of amino acids-	15-07-18 To 11-08-18	03 02 02 02 02		Unit -III 29/08/18

		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.	11-08-18 To 31-08-18	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.	01-09-18 To 20-09-18	05 05		
		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.	19-09-18 To 09-10-18	02 02 03 04		

Sr. No.	Practical's	Date	No. of Practicals
1	Introduction to measurements: balances and pipetting. Preparation of solutions of given normality and its standardization.	02/07/18 to 22/10/18 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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Structured Work Plan for Teaching

Academic Year 2018-19 (Term-II)

Details of Classes to be taught

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Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc. BT I	Suraj D. Kadam	Biotechnology	Course Title Biophysics and Bioinstrumentation Course Code: U-BBI-287 Course Title: Lab Course V Course Code: U-LAC-291


Sr. no	Name of Chapter	Contents	Date of Completion	No of Lectures required
1	Unit II Chromatography Techniques	1. General Principle 2. Plane Chromatography: Paper 3. Thin layer Chromatography 4. Column Chromatography: Ion Exchange	15-12-18 To 6/01/18	5
2	Spectroscopic Techniques	1. Definition. Electromagnetic wave 2. Electromagnetic spectrum 3. Applications of each region of electromagnetic spectrum for spectroscopy. 4. Introduction to molecular energy levels. Excitation. Absorption. Emission. Rotational spectra. 5. Principle, construction and working of colorimeter, 6. Principle, construction and working of UV- Visible	09-01-18 To 04-02-2018	7


	<p>3. Body temperature and its regulation.</p> <p>1 Optics: Properties of light: Reflection, refraction, dispersion, diffraction, Interference and Polarization.</p> <p>2 Concept of polarization.</p> <p>Polarization by reflection – Brewster's law. Polarization by double refraction – Nicol Prism.</p> <p>3 Concepts - Resolving power. Chromatic and achromatic aberrations. Construction and working of following microscopes– Dissecting,</p> <p>4 Compound light and Darkfield.</p> <p>5 Phase contrast.</p> <p>6 Fluorescence. Electron microscopes: Concept of vacuum, Working of electron gun.</p> <p>7 Construction and working of SEM, TEM, STEM. Sample preparation.</p>		7
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	<p>Unit I</p> <p>Magnetism</p> <p>Fluid Statics</p> <p>Atomic structure</p>	<p>1 The magnetic field. The definition of B. Poles and dipoles.</p> <p>2 Gauss' law of magnetism. Magnetism of earth.</p> <p>3 Paramagnetism. Diamagnetism. Ferromagnetism. Nuclear magnetism. Biomagnetism with examples.</p> <p>4. Fluids: Definition, Pressure and Density.</p> <p>5. The variation of pressure in a fluid at rest. Pascal's Principle. Measurement of pressure. Various units of pressure and their inter-conversion.</p> <p>1. Historical background upto Bohr model. Significance of second and third postulate of Bohr's model.</p> <p>2. Derivation of radius and energy value. Quantization of energy levels using Rydberg's constant,</p> <p>3. Atomic spectra is signature of the element. Bohr – Sommerfeld model. Vector atom model. Quantum numbers. Selection rules.</p> <p>4. Uncertainty Principle, Pauli's exclusion principle. Emission spectra to understand selection rules.</p>	<p>15-12-18</p> <p>To</p> <p>6/01/18</p>	<p>3</p> <p>3</p>
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Academic calendar (for practical's)

Sr. no	Name of experiment	Date of completion	No of days for same practical
1.	TLC , Paper Chromatography	05-01-18 and 08-01-18	01
2.	Instrumentation – Colorimeter	05-01-18 and 08-01-18	01
3.	Study of Lambert's & Beer's laws	05-01-18 and 08-01-18	02
4.	Absorption spectrum of protein	12-01-18 and 15-01-18	01
5.	Safety measure – time	12-01-18 and 15-01-18	01
6.	Agarose Electrophoresis	19-01-18 and 22-01-18	01
7.	pH meter	02-02-18 and 05-02-18	01
8.	Temperature measurement: using thermocouple, RTD	09-02-18 and 12-02-18	01
9.	Practicals Based on Microscopy	16-02-18 and 19-02-18	01
10.	Problems based on Radioactivity	23-02-18 and 26-02-18	01


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Sr. No.	Class	Name of Asst. Prof.	Subject	Paper
1	B.Sc. BT II	Suraj D. Kadam	Biotechnology	Course Title Fundamentals of Molecular Biology Course Code: U-FMB-500 Course Title: Lab Course XVI Course Code: U-LAC-504


Sr. No.	Name of Chapter	Contents	Date of Completion	No. of Lectures Required
1.	Unit - I	The beginnings of molecular biology Introduction, Historical perspective, The structure of DNA-Primary structure: the components of nucleic acids, Secondary structure of DNA, Tertiary structure of DNA, Genome organization: from nucleotides to chromatin, Introduction, Eukaryotic genome, Bacterial genome, The versatility of RNA, Introduction, Secondary structure of RNA, Tertiary structure of RNA, Roles -RNA is involved in a wide range of cellular processes, Unique function: The discovery of RNA catalysis and Ribozymes catalyze a variety of chemical reactions	15/12/2018 To 30/12/2018	10
2.	Unit - II	From gene to protein 1. Introduction 2. The central dogma 3. The genetic code Protein structure, Protein function Prokaryotic Transcription and Translation Eukaryotic Transcription and Translation Post Transcriptional and Post Translational Modifications in Eukaryotes	16/01/2018 To 05/02/2018	12
3.	Unit - III	DNA replication and Telomere maintenance 1. Introduction 2. DNA polymerases are the enzymes that catalyze DNA synthesis Historical Perspective 3. Semidiscontinuous DNA replication- In prokaryotes and eukaryotes	01/01/2018 To 15/01/2018	08


		4. Telomere maintenance: the role of telomerase in DNA replication, aging, and cancer		
4.	Unit IV	<p>DNA repair, recombination and gene expression</p> <ol style="list-style-type: none"> 1. Introduction 2. Types of mutations and their phenotypic consequences 3. General classes of DNA damage 4. Repair of single Base excision repair <ul style="list-style-type: none"> -Mismatch repair - Nucleotide excision repair <p>Disease - Hereditary nonpolyposis colorectal cancer: a defect in mismatch repair Base changes and structural distortions by removal of DNA damage</p> <ol style="list-style-type: none"> 5. Double-strand break repair by removal of DNA damage <ul style="list-style-type: none"> -Homologous recombination -Nonhomologous end-joining <p>Disease -Xeroderma pigmentosum and related disorders: defects in nucleotide excision repair</p> <p>Disease - Hereditary breast cancer syndromes: mutations in <i>BRCA1</i> and <i>BRCA2</i></p> <ol style="list-style-type: none"> 6. SOS repair 7. Prokaryotic gene expression and regulation <ul style="list-style-type: none"> -Operon concept-Lac operon, Tryptophan operon, Arabinose operon 8. Eukaryotic gene expression and regulation (in brief) 	<p>6/02/2018</p> <p>To</p> <p>30/02/2018</p>	15

Academic calendar (practical's)

Sr. no	Name of experiment	Date of completion	No of days for same practical
1	The study of fundamental laboratory techniques in molecular biology	02/01/2018 (A) 08/01/2018 (B)	01 01
2.	Isolation of DNA from Bacterial cells.	09/01/2018 15/01/2018	01 01
3.	Isolation of DNA from Animal cells.	16/01/2018	02
4.	Isolation of DNA from plant cells.	22/01/2018	02
5.	To resolve the given DNA sample by using agarose gel electrophoresis.	23/01/2018 29/01/2018	02 02
6.	Quantification of DNA by using Diphenylamine (DPA) method	05/02/2018	02
7.	Spectroscopic determination of nucleic acid purity and concentration.	20/02/2018	02
8.	To estimate RNA quantitatively using orcinol reagent.	20/02/2018	02
9.	Extraction of crude enzyme/protein and To estimate protein in the plant and animal sources by using Folin-Lowry's method.	26/02/2018	02
10.	To carry out ammonium sulphate precipitation of amylase enzyme present in the crude protein extract.	05/03/2018	02
11.	To carry out dialysis for desalting ammonium sulphate precipitated enzyme.	06/03/2018 12/03/2018	02 02
12.	To determine the molecular weight of the given protein by SDS-PAGE.	13/03/2018	02
13.	To Prepare a survival curve for the given bacterial culture using germicidal ultraviolet Radiation as a mutagen.		


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