



MAHILA VIKAS SANSTHA, WARDHA

**INDRAPRASTHA NEW ARTS, COMMERCE AND SCIENCE
COLLEGE WARDHA DIST 442001(M.S)**

(Affiliated to RTM Nagpur University)
www.nacscwardha.org

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The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment



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Teaching Plan



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Date:19/04/2024

DECLARATION

This is to declare that the information, reports, true copies and numerical data etc. furnished in this file as supporting documents is verified by IQAC and found correct. Hence this certificate.

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Coordinator

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Session 2022-2023 (^{Winter} Summer Session)
 Department Name: Biotechnology
 Course Name: B.Sc 1st sem
 Subject:- Biotechnology - I
 Faculty:- Ass. Prof. Ashika Dhage

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	History Development	History and development of microbiology, contribution of Louis Pasteur, Robert Koch.	3
		Compound microscopy, Numerical Aperture and its importance	
	Microscopy	resolving power, oil immersion	
		Stain and staining Procedure	Acidic, Basic and Neutral Stains, Gram staining, Acid fast staining, flagella staining, Endospore staining
Unit II	Bacterial Morphology	Bacterial morphology and subcellular Morphology of Bacteria	



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		Shape and size generalized slime layer, capsule.	
		Difference between the structures function and the position of the two structures.	
Unit III		A brief idea Bergey's manual. Morphology of archaea archaeal cell cell membrane	03
Unit IV		Nutrition: Basic nutritional requirement: Basic idea of such nutrient as water, carbon, nitrogen, sulfur and vitamins etc. natural and synthetic media, nutritional Classification of Bacteria.	
Unit V		Selective and differential media, Enriched media, Enrichment media.	

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Session 2022-2023 (Summer Session)
 Department Name: Biochemistry
 Course Name: B.Sc 1st sem
 Subject:- Macromolecules - II
 Faculty:- Damini D. Dambhok

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Nucleic Acid	chemical structure and base composition of nucleic Acid	03
		Chargaff's rules, Watson crick Model, (B-DNA), deviations from Watson - crick model, other forms of DNA. (A and Z DNA)	
	Co	force stabilizing, nucleic Acid structure. (Hydrogen bond)	
		(Maxam and Gilbert DNA sequencing, structure of t-RNA	
Unit II	chromosomes Concept of Genes	Concept of Prokaryotic genes Eukaryotic genes.	03

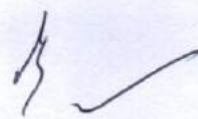


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		Defination of gene concept of split gene, introns and exons	
		Spacers, C-value and c-value Paradox, basic idea of cot curves.	
Unit III	Amino Acid	structure of Amino Acids occurring in Proteins, classification of amino acid.	
Unit IV		Secondary structure of proteins: The α -helix, β -structure (Parallel, antiparallel, mixed β -turn)	
Unit V		Tertiary structure Proteins forces that stabilizes the structure (electrostatics forces, hydrogen and disulfide bond).	



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Session 2022-2023 (Summer Session)

Department Name: Biototechnology

Course Name: B.Sc IInd Sem

Subject:- Biototechnology-I

Faculty:- Aashika Phage

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I		Microbial growth.	
		Growth: Growth rate and generation time, details of growth curve its Phase.	03
		Concept of synchronous cultures,	
		continuous and batch cultures.	
		measurement of growth.	
		Physical conditions required	
		for growth, temperature, Ph.	
		etc. maintenance of Pure cultures.	
Unit II		Microbial control.	03
		Microbial control: Terminologies	



		mechanism of cell injury.	
		Physical control, temperature (moist heat, autoclave)	
		Chemical control: Antiseptics and disinfectants.	
		concept of biological control.	
Unit III		cell Biology :	
		Eukaryotic cell :- structure and function of cell, nucleus,	03
		Golgi complex, endoplasmic reticulum, lysosomes,	
Unit IV		Peroxisomes,	
Unit IV		plant cell wall, cytoskeleton (actin) and cell locomotion.	02
		Mitosis and meiosis,	
		muscle and nerve cell structure.	

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Session 2022-2023 (Summer Session)
Department Name: Biochemistry
Course Name: B.Sc II nd sem
Subject:- Biotechnology-II
Faculty:- Damini D. Dumbre

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I		carbohydrates .	03
		Definitions : classification,	
		Structure of monosaccharides,	
		(structure of starch and	
		glycogen as example of	
		homopolysaccharides) .	
		Concept and examples of	
		heteropolysaccharides .	
Unit II		Lipids .	03
		Types of lipids , saturated and	

		and unsaturated fatty acid.	
		triglycerides, phospholipids	
		Terpenoids and isoprenoids.	
		concept of acid value -	
		Saponification value and	
		iodine value.	
Unit III		Topics :	03
		Types of lipids, structures of	
		saturated and unsaturated.	
Unit IV		Enzymes :-	
		Terminology: Active site,	
		allosteric site, Holoenzyme	
		apoenzyme, apoenzyme,	
		coenzyme.	
Unit V		Assay of Enzyme,	02
		concept of activity, specific	
		activity, turnover number,	
		UNITS.	

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Session 2022-2023 (^{winter.} ~~Summer~~ Session)
Department Name: Biotechnology.
Course Name: BSC III sem.
Subject:- Biotechnology Paper I.
Faculty:- Anjali P. Chalpe.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Bioenergetics.	Bioenergetics is the branch of	2
		Biochemistry that focuses on how	
		cells transform energy, often by producing storing or consuming (ATP)	
	Glycolysis	Glycolis is the metabolic pathway	5
		that converts Glucose into pyruvate,	
		and in most organisms occurs in the liquid part of cell.	
Gluconeogenesis.	Gluconeogenesis is the process that	3.	
	allows the body to form glucose		
	from non-hexose precursors,		
	particularly glyceral, lactate, pyruvate, propionate, and glucogenic A.A		
Unit II	Lipid metabolism.	Lipid metabolism involves the synthesis of the structural and functional lipids.	

	β -oxidation	fatty acid β -oxidation is the process by which fatty acids are broken down to produce ^{energy} .	2
	ketogenesis	ketogenesis is a metabolic pathway that produces ketone bodies, which provide an alternative form of energy of body.	3
Unit III	mitochondria	Mitochondria is an organelle found in the cells of most eukaryotes. such as animals.	3
Unit IV	Transamination	Transamination is a chemical reaction that transfers an amino group to a ketoacid to form new amino acid.	2
	Urea cycle	The urea cycle is the body's way of converting toxic ammonia into urea.	2
Unit V			



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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: BSC Sem IInd
 Subject:- Biotechnology Paper II.
 Faculty:- Vaishnavi Kakde.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Spectro- photo- metry	concept of electromagnetic radiation	3
		spectrum of light, absorption of	
		electromagnetic radiation	
		concept of chromophore and	4
		auxochromes, involvement of	
		orbitals in absorption of	
		electromagnetic radiation, Absorption.	
		spectrum and its uses, Beer's	2
		law	
		deviation and deviation extinction	
	coefficient difference between		
	spectrophotometer and colorimeter.		
Unit II	Application of UV.		3

	Spectrophotometry	Principle, Instrumentation.	
		and application. Absorption and emission flame photometry.	3.
		Principle, instrumentation & Application.	
Unit III	Chromatography	Partition principle, partition coefficient, nature of partition	3.
		forces; brief account of paper chromatography.	
Unit IV	Ion-exchange chromatography	Partition principle, partition coefficient, nature of partition.	3
		forces. Type of resins; choice of buffers; applications including	
		amino acid analyzer.	
		affinity chromatography, principle, selection of ligand.	
Unit V			

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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: BSC IV sem
 Subject:- Biotechnology paper I.
 Faculty:- Anjali Chalpe

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Immunology.	Immune system, organs and cells of immune system.	3
		immunity - innate immune mechanism.	
		It is also called specific immunity because it tailors its attach to a specific antigen previously encountered.	
	Acquired immune mechanism	It is also called specific immunity because it tailors its attach to a specific antigen previously encountered.	4
		The complement system is part of	
		four body's immune system that cleans up damaged cell helps your body heal after an injury or an infection and destroys	
Unit II	Antibody structure.	The antibody has a V-shaped structure, made up of four	2.

		Polypeptide subunit. each subunit has two identical light & heavy chains.	
	Antibody classes:	five types of antibodies each with a different function.	4
		IgG, IgM, IgA, IgD and IgE.	
		They are distributed and function differently in the body.	
Unit III	Hypersensitivity	Hypersensitivity (also called intolerance) is an abnormal physiological condition in which.	4
Unit IV	vaccination	vaccination is a simple safe and effective way of protecting people against harmful diseases before they come into contact with them.	3
	Immuno-logical Technique.	Antigen Antibody reaction, Precipitation, agglutination, complement fixation immunodiffusion.	2.
Unit V		ELISA.	

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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology.
 Course Name: BSC # IV sem
 Subject:- Biotechnology paper II
 Faculty:- Vaishnavi Rakde.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	migration of ions	Factor affecting electrophoretic mobility. The term migration	4
		refers to the movement of ions due to an externally applied electrostatic field.	
	Paper electrophoresis	The technique of paper chromatography is simple and inexpensive and requires only micro quantities.	3
		Gel electrophoresis is a technique used to separate DNA fragment	
	Gel electrophoresis	based on their size and charge.	3
		electrophoresis involves running a current through a gel.	
Unit II	SDS - PAGE.	Sodium Dodecyl Sulphate	2
		polyacrylamide gel electrophoresis	

		is a technique used for the separation of proteins based.	
	Isoelectric focussing	Also known as electrofocussing is a technique for separating different molecules by differences in their (pI)	
Unit III	Isotopic Teacher Taqumic	Radioactive & stable isotopes Rate of radioactive decay, units of radioactivity.	
Unit IV		measurement of radioactivity falling drop method for deuterium measurement mass spectrometry	
	centrifugation.	liquid scintillation counters, analytical centrifugation, sedimentation coefficient.	
Unit V			

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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: BSC V sem.
 Subject:- Biotechnology Paper I.
 Faculty:- S. Petaje Sir.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	DNA Replication	Enzymology of Replication detailed	04
		treatment of DNA polymerase I.	
		brief treatment of pol II and III	
	Helicase topoisomerases, single	standed binding proteins, DNA	06
		melting proteins, primase and	
		RNA primers, distributive and	
	enzymes used in Replication.	processive properties of DNA	04
		polymerase I and III	
importance of the β -subunit			
in polymerase III. i) proof for semiconservative replication.			
Unit II	Discontinuous replication and	Okazaki fragments, Replication	05
		origins.	

	mutations & DNA Repair.	Gene mutations: Missense -	3.
		Nonsense and frameshift mutations.	
		mutagens: physical and chemical mutagens.	4
		Repair: mismatch repair.	
		NER, BER, light induced Repair	
Unit III	Transcription.	Enzymatic synthesis of RNA:	4
		Basic features of transcription	
		structure of prokaryotic RNA polymerase.	
Unit IV		Enzyme and Holoenzyme	3
		Significance of σ factor, concept of promoter (Pribnow box, -10 and -35 sequences and their significance.	
		four steps of transcription	
	Promoter binding and activator	4	
Unit V		RNA chain initiation and promoter escape, chain elongation, termination and release. detail account of.	5
		Initiation, elongation, termination.	

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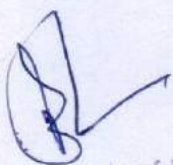
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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: B.Sc sem IV
 Subject:- Biotechnology Paper II
 Faculty:- Sandip. patil

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Genetic code.	Genetic code: Argument for triplet code, experimental elucidation of codons, identification of start and stop codons,	4	
		universality, degeneracy and commaless nature of codons.		
	decoding system.	The decoding system: amino synthetases, brief structure of t-RNA, the adaptor Hypothesis	4	
		attachment of amino acid to t-RNA. codon anticodon interaction. Wobble Hypothesis		
	Unit II		Selection of initiation codon	4
			shine and Dalgarno sequence.	

		Initiation, elongation &	4
		Termination. Regulation of	
	Protein synthesis	translation: Autogenous control of γ -protein, phage	5
		T ₄ protein p32 translational	
		regulation antibiotic	
		translational	
Unit III	γ -DNA Technology	DNA cloning: Basics of genetic	3
		engineering, restriction endo-	
		nucleases, other enzymes of	
Unit IV	Vector:	DNA manipulation. sets:	
		plasmid vector (pPR32 and	
		PUC 18/19)	4
		phage vector, Lambda replace-	
		ment and insertion vector	
	cosmid, phagemids and YAC.		
Unit V	Genomic DNA.	concept of and method of	
		creating these libraries,	5
		Advantages and disadvantages	
		of genomic DNA and c-DNA	
	library over genomic library		



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Session 2022-2023 (Summer Session)

Department Name: Biotechnology.

Course Name: BSC VI sem.

Subject:- Biotechnology Paper I.

Faculty:- Petare sir.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Enviromental Biotechnology.	water and waste water treatment process, current community drinking	3
		water treatment process disinfection	
		of water (chlorination and ozonation)	
	Biodegradation.	secondary and advanced treatment of sewage (domestic waste water).	2
		definition and concept of.	
		Biodegradation, biodegradation and Biotransformation. and current community drinking water.	
Unit II	xenobiotic	Xenobiotic is an term used to describe chemical substances that	

		renobiotic and fecal transplant compounds. Bioaccumulation.	
	waste-water quality.	concept of COD - chemical oxygen demand, DO - dissolved oxygen and BOD - Biological oxygen demand.	3
Unit III	Food Biotechnology.	food Biotechnology production, and types of cheese, microorganism as food-	3
Unit IV		production of mushroom and spirulina, assessment of microbiological quality of various foods. Industrial awareness, Quality control and quality assurance in food	4
		and pharmaceutical industry concept of current good manufacturing practices in industry	3

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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology.
 Course Name: BSC VI Sem.
 Subject:- Biotechnology Paper II
 Faculty:- Amjali P. Chalpe.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	cell culture.	cell culture or tissue culture.	4
		is the process by which cells are	
		grown under controlled condition, generally outside of their natural environment.	
	Tissue culture.	The term tissue culture was	5
		coined by American pathologist Montrose Thomas-Barrows.	
	cellus and suspension culture.	plant tissue culture. is called	3
		cell suspension culture. plant	
		cells have an interesting ability called totipotency. Because of this individual	
Unit II	micropropagation.	plant cells have the potential	5
		to develop into complete plant.	

		Tissue and micropropagation.	
		suspension culture, callus formation.	
	Transgenic plant	cloning in plants Ti-plasmid	
		concept of transgenic plant.	
		Bt-cotton and other plant application.	
Unit III	Animal cell	Various technique of animal cell	
		and tissue culture. growth.	3
		factors, Laboratory facilities.	
Unit IV	Recombinant DNA.	Brief technique of about	
		Recombinant DNA products in	4
		medicine (insulin; somatostatin	
		vaccines) concept of gene	
		therapy production of	3
		Recombinant vaccines - Hepatitis	
Unit V			

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Session 2022-2023 (^{Winter} Summer Session)
Department Name: Biotechnology
Course Name: Bsc Sem I
Subject:- Microbiology I
Faculty:- Vaishnavi Kakde.

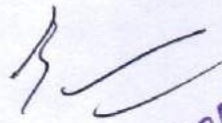
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required		
Unit I	Fundamentals of Microbiology	Paper I :- Fundamentals of Microbiology.	2		
		History of microbiology, 1) Discovery of microbes, 2) Theory of biogenesis & abiogenesis 3) contributions of - Antonie van Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Winogradsky, Beijerinck, John Tyndall, Thomas M. Rivers.			
		4) Branches of microbiology - Definition and scope of a) Systemic microbiology - Bacteriology, mycology, Phycology, virology. b) Biotechnology c) Cyto microbiology d) exobiology e) medical microbiology			
	Contributions of Scientists			3	
		Medical Microbiology.			4
Unit II	Cell Structure	Bacterial cell structure.	2		
		1) Different between Prokaryotes and eukaryotes.			

	cell culture	2) description of sizes, shape and arrangements of bacteria.	2
		3) Typical Bacterial cell culture	
	Endospore structure	4) Ribosomes, Nucleoid, Plasmid, cytoplasmic inclusions	4
		5) capsule, slime layer, Pili.	
6) Endospore structure.			
7) Exospores, myxospores, 8) significance of dormancy.			
Unit III	Nutritional types of Bacteria	8 Microbial mutation.	3
		1) Nutritional types of Bacteria	
		2) Basic Nutritional requirements	
	Media for Fungi Isolation	3) Types of culture media - selective, differential, Enriched Synthetic & non-synthetic	2
		4) media for isolation of fungi, Definition, ingredients, Principles and applications.	
		5) Enriched culture.	
		Microbial growth.	
		1) Bacterial Reproduction.	
Unit IV	Bacterial Reproduction	2) Axenic cultures	4
		3) growth curve.	
		4) mathematical expression of growth.	
		5) continuous culture	
	growth factors	6) synchronous growth.	
		7) diauxic culture	
		8) Factors influencing growth.	


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Session 2022-2023 (^{winter} Summer Session)
 Department Name: Biotechnology
 Course Name: Bse sem I
 Subject:- Microbiology - II
 Faculty:- Vaishnavi Kakade

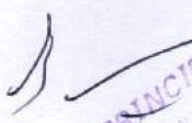
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	History of microbiology	The work of microscopy remained unknown before invention of microscope. <u>Salvino D'Acemate</u> is credited with inventing the first wearable eye glasses in 1280. <u>Hans and Zacharias Janssen</u> (1590) created the microscope.	04
	Light and Dark microscopy	Light microscopy - It is a type of microscopy in which light beam is used. Dark microscopy - In dark field object remains white and rest of field is dark. Resolution is good as that in bright field while contrast is enhanced.	03
	TEM and SEM microscopy	TEM is used to see fine structure of cells an object as small as 1mm may be viewed. ultra-thin sections of objects are prepared. SEM - The SEM uses electrons instead of light to form an image. The SEM also allows researchers to examine a much bigger variety of specimen.	03
Unit II	Type of stain	Acidic or anionic dye Basic or cationic dye - Neutral dye	02

		Dyes with Amino group Dyes with Azo group.	02
	Simple and differential staining	Dyes with Indamine group Simple staining - In this only one stain is used for staining of bacteria	03
		Differential staining - It involves the use of series of dyes and sometimes additional chemical is used.	
Unit III	Microbial Techniques	Methods to determine nutritional requirements Preservation of microorganisms Determination of cell activity International and national collection centres.	05
Unit IV	Physical agents	High temperature - moist heat and dry heat, Tyndallization Pasteurization, Autoclaving Radiation.	04
	Chemical agents.	Phenolic compounds, halogens Detergents, heavy metals.	03
Unit V			


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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: BSc sem II
 Subject:- microbiology-I
 Faculty:- Vaishnavi Kakde,

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Bacterial Introduction	Microbial Diversity .	2
		Prokaryotic microbes .	
		1) General characters of (a) Proteobacteria (b) Mycoplasma (c) Rickettsia (d) Chlamydia .	
		2) Cyanobacteria .	
		3) Actinomycetes characteristics Applications.	
Archae Bacteria		4) Archae bacteria : Types of archae bacteria (Brief description) methanogenic bacteria and their importance .	2
	Eukaryotic Microbes	Eukaryotic Microbes .	3
		1) Fungi & Yeast : General characters	

		Asexual and sexual mode of reproduction.	2
	Algae & Protozoans	2) Algae :- general character and industrially important algal cells.	
		3) Protozoans :- General character	3
Unit III	Viruses	Acellular microbes / viruses.	
		1) Discovery of viruses, general structure, symmetry and classification.	
		2) cultivation, chick embryo.	2
		3) detection of viral growth	
		4) T ₄ - Bacteriophages.	
		5) Lambda phage.	
Unit IV	Rhizobium & Nitrogen fixation	Microbial Interaction.	4
		1) positive & negative interaction	
		2) Predation, antagonism.	
		3) Protist - Protist interaction	
		4) Protist - animal interaction.	

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Session 2022-2023 (Summer Session)

Department Name: Biotechnology

Course Name: BSc Sem II

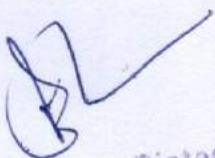
Subject:- microbiology-II

Faculty:- vaishnavi katde

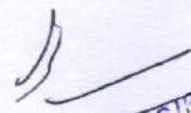
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Classification of food	Classification on basis of ease of spoilage - sources of microorganisms in food, microbial load.	
	spoilage of vegetables	Factors responsible and types of spoilage. microorganisms responsible for spoilage.	
	spoilage of meat and meat products	Factors responsible and types of spoilage. spoilage of Canned foods - Factors responsible and types.	
Unit II	Preservation of food	General principles of food preservative preservation	

Unit III			
Unit IV			
Unit V			


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Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: BSE sem III
Subject: Microbiology I
Faculty: Ruchika Z. Rewatkar

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	carbohydrates	carbohydrates and lipids.	2
		1) classification of carbohydrates.	
		2) structure of glucose, fructose, maltose, lactose,	
	structure of glucose	sucrose, raffinose, starch, hyaluronic acid, glycogen, cellulose,	2
		osazone formation.	
	classification of lipids.	3) classification of lipids,	3
structure of triglycerides,			
compound lipids, derived lipids.			
Unit II	Amino acids	Amino acid and proteins	2
		1) classification of amino acids	

	titration curve.	2) Titration curve, acidic, basic and neutral amino acids.	2
	Proteins structure	3) Peptide bond theory. 4) organizational levels of proteins. 5) oligomeric proteins	3
Unit III	Enzymology	Enzymology. 1) Definitions and nature of enzymes, classification nomenclature.	2
Unit IV	Enzyme kinetics	2) Primary concept of enzyme kinetics, MM equation. 3) Activation energy, transition state, ES complex. 4) Enzyme regulation and types. 5) Enzyme inhibition & types	4
Unit V	Nucleic acid	6) concepts of enzymes. 7) membrane bound enzymes. nucleic acid and vitamins. 1) structure of Purines & Pyrimidines 2) structure of DNA, RNA. 3) types of vitamins.	4
		4) Hypervitaminosis - causes, symptoms and vit. A, E, vit. D. 5) Hypovitaminosis - vit. B12, A, and D.	

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Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: Bsc Sem III
Subject:- Microbiology II
Faculty:- Ruchika Rewatkar

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Fermentor	Fermentors known as bioreactor,	
		Sterilised and enclosed vessels	
		that are used for growth of microorganisms under optimal condit ⁿ	
	Types of fermenter	many types of bioreactor, including column bioreactor, continuous stirred tank bioreactor,	
		fluidized bed bioreactors, packed bed bioreactors,	
	Primary screening	It helps to determine the	
		microorganisms and organic acid in cells and other desired organisms. Primary screening is designed to isolate potentially interesting microorganisms,	
Unit II	Inoculum development	Inoculum development media must be similar to production media to decrease lag phase and	

		fermentation time. Inoculum media to decrease should have sufficient carbon & nitrogen to support.	
	Harvesting of biomass	Biomass is known as total organic matter, The energy from the biomass can be harvested directly via combustion to produce heat energy.	
Unit III	Sterilization of fermenter	Steam is introduced inside the glass fermentor vessel from an input port, steam or heat pressure inside fermenter is greater than atm. pressure.	
Unit IV	Citric acid	It is colourless weak organic acid. It is an intermediate in the citric acid cycle, which occurs in metabolism of aerobic organisms.	
	Single cell protein	Single cell protein is generic term for crude or refined protein whose origin is bacteria, yeasts, molds or algae.	
Unit V			

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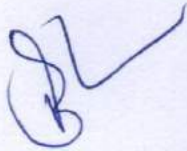
Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: Bsc sem IV
 Subject:- Microbiology I
 Faculty:- Ruchika Rewatkar

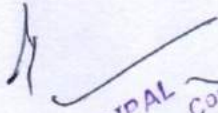
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Classification of carbohydrates	metabolism.	2
		1) carbohydrates.	
		2) EMP pathway & its regulation	
		3) TCA cycle and its regulation.	
		4) outline of ED pathway.	2
		5) pentose phosphate pathway.	
		6) PK pathway.	
Unit II	Lipids.	Lipid and Nucleic acid.	3
		1) Beta oxidation and omega oxidation	

		2) Replication of DNA, modes of replication, general features, enzymes involved	2
	Rolling circle model	rolling circle model and knife fork model,	2
		3) prokaryotic transcription	
Unit III	Introduction of Amino acids	Amino acids and proteins	2
		1) Amino acid breakdown,	
		2) metabolic breakdown	
		3) glycosyl and ketogenic amino acids.	
Unit IV		a) genetic code	3
		b) prokaryotic translation	
		Energy generation.	
		1) High energy molecules.	
Unit V	Substrate level phosphorylation	2) substrate level phosphorylation.	4
		3) cyclic and non-cyclic phosphorylation.	
		1) oxidative phosphorylation and ATP generation.	




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Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: BSc Sem IV
Subject:- Microbiology II
Faculty:- Rakshanda Nagale

Lesson Plan format

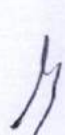
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Fresh Water	The water containing a very small amount (negligible) of salt present in it is known as freshwater.	3
	Potable Water	Drinking water or potable water is water that is safe for ingestion, either when drunk directly in liquid form or consumed indirectly through food preparation.	4
	Fecal organisms	A fecal coliform is a facultatively anaerobic rod shaped, gram-negative, non-sporulating bacterium. Coliform bacteria generally originate in the intestines of warm blooded animals.	3
Unit II	Primary treatment	Primary treatment removes material that will either float or readily settle out by gravity.	2

		It includes the physical processes of screening, comminution, grit removal & sedimentation	
	Secondary treatment	is a biological treatment process designed to reduce the amount of organic materials in the wastewater before it is discharge to a disposal field for final treatment and dispersal in the soil.	3
Unit III	Air microbiology	Biological material including microorganisms and toxins can be found in air or the atmosphere & the study of ^{this area is} termed as aeromicrobiology.	2
Unit IV	Bioremediation.	Bioremediation is a biological process that uses living organisms, usually microorganisms (bacteria & fungi) & plants, to degrade, remove, immobilize & detoxify waste ^{products & pollutants} from soil or water.	3
	Bioaugmentation	Biological augmentation is the addition of archaea or bacterial cultures required to speed up the rate of degradation of a contaminant.	
Unit V			



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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: Bsc sem V
 Subject:- Microbiology I
 Faculty:- Vaibhavi Ughade mam

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Medical Microbiology	medical microbiology.	
		Epidemiology and host-parasite relationship.	3
	Various Diseases.	1) Definitions, signs, symptoms, syndrome, stages of infection	
		Acute infection, atypical infection, latent infection.	
	Disease Control.	2) Dynamics of disease transmission	4
		causative or ecological agents sources of reservoirs.	
		Exogenous, Endogenous infection.	
	3) control of communicable diseases.		
	control of sources, blocking channels of transmission	3	
	Protecting of susceptible host.		
Unit II	Infectious	Infectious microbiology and	2
		normal flora.	

		1) Microbial mechanism of Pathogenicity .	2
	Normal flora.	2) Normal flora of healthy human host,	3
		3) Infectious microbiology Respiratory & Cardiovascular.	2
Unit III	Bacteria	Study of pathogenic organisms	2
		1) Bacteria .	
		1) E. coli , 2) S. aureus,	2
Unit IV		3) Salmonella typhi .	
		4) Mycobacterium tuberculosis .	
		5) Spirochetes - Treponema pallidum .	
		2) Viruses, HIV, Hepatitis B.	3
		3) Protozoa ,	
Unit V	Anti-metabolites	Disease control.	
		1) Basic mechanism of action of drug ,	4
		2) Non automated drug system.	
		3) Various mechanisms of drug.	

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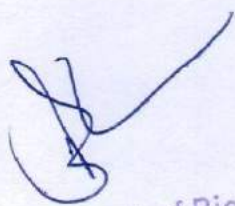
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Winter
Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: BSC Sem IV
Subject:- Microbiology II
Faculty:- Vaibhavi Ughade

Lesson Plan format

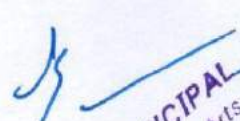
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Concept of gene	A gene is the basic physical and functional unit of heredity. Genes are made up of DNA.	4
	Gene regulation	Gene regulation is the process used to control the timing, location and amount in which genes are expressed.	3
	Mutation	A mutation is a change in the DNA sequence of an organism. Mutations can result from errors in DNA replication during cell division; exposure to mutagens or a viral infection.	5
Unit II	Transformation	Transformation is a process by which foreign genetic material is taken up by a cell.	2

	Conjugation	conjugation is the process by which one bacterium transfers genetic material to another through direct contact. E. coli is an example of bacteria that exhibits conjugation gene transfer.	3
Unit III	Electrophoresis	Electrophoresis is a laboratory technique used to separate DNA, RNA or protein molecules based on their size & electrical charge.	2
Unit IV	Chromatography	Chromatography is an important biophysical technique that enables the separation, identification and purification of the components of a mixture for qualitative & quantitative analysis.	3
	Isotope tracer technique	isotopic tracer techniques as applied in studying the metabolism of carbohydrates, fatty acids, phospholipids, steroids, proteins, amino acids, nucleic acids, purines and minerals. constitute some of	4
Unit V			



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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: BSc sem VI
 Subject: Microbiology I
 Faculty: Vaibhavi Ughade mam

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Immunology Introduction	Immunology Immunity and non-specific defences.	3
		1) Immunity.	
		2) Haematopoiesis and cell of immune system.	
	First line defense.	3) Non-specific defences of host.	4
		4) Mechanism of non-specific defense	
		A) First line of defense.	
		b) second line of defense c) cellular components.	
	Para 3) Functions :- Phagocytosis complement activation, coagulation system, Inflammation.		
Unit II	Antigen	1. Antigen,	3
		2) Immunoglobulins.	

		1) structure of basis unit, chemical and biological properties.	2
	Primary lymphoid organs.	2) molecular basis of antibody	3
		3) organs of immune system Primary lymphoid organs.	
		Secondary lymphoid organs.	
Unit III	Acquired immunity	Adaptive / Acquired immunity	3
		1) Active and passive immunity	
		2) clonal selection and clonal deletion.	
Unit IV		3) clonal selection and clonal deletion.	2
		2) cell mediated immune response.	
		3) T-cell biology.	
		4) cytokines.	
Unit IV	Antigen-antibody complex	Antigen- Antibody interaction	4
		2) Antigen-antibody reactions.	
		1) precipitation.	
		3) Hypersensitivity reactions.	

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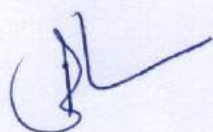
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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: BSc sem VI
 Subject:- microbiology II
 Faculty:- _____


Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Gene cloning	Tools and techniques of genetic engineering.	2
		1) Introduction :- Definition, scope of biotechnology.	
		2) Preparation of pure sample of DNA.	
		3) Introduction of pure sample	3
		4) Identification of transform cell.	
		5) Expression of cloned genes.	
Gene Library	Construction of gene library, cells for cloning, expression of prokaryotic genes.	2	
	5) PCR & its application, DNA fingerprinting.		
Unit II	Hormones	Health care biotechnology.	2
		1) Production of hormones.	

	Hybridoma technology	2) Production of Interferon 3) Production of vaccines. 4) Hybridoma technology 5) gene therapy.	2
Unit III	Biopesticides	Agricultural Biotechnology. 1) Protoplast fusion. 2) Production of biopesticides. 3) Production of Biofertilizers 4) oriental fermented food, 5) Genetically modified foods. 6) Transgenic Plants.	3
Unit IV			
Unit V	Biosensors	Industrial Biotechnology. 1) Biosensors - general concept of construction. 2) Biochips - definition example of applications. 3) Enzyme technology. 4) Ethics & hazards of biotech.	4



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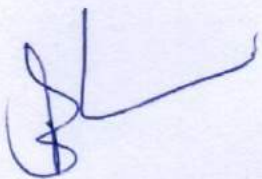
Session 2022-2023 (^{Winter} Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc. I sem
 Subject:-
 Faculty:- Anjali Chalpe

Molecular Biology


Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	DNA Replication	In molecular Biology, DNA replication is the biological process of producing two identical replicas of DNA from one original DNA molecule.	3
	Gene Mutations	Mutations are alteration in the nucleic acid sequence of the genome of an organisms, virus or extrachromosomal DNA. Mutations can be many types such as Substitution, deletion, insertion & translocation.	2
	DNA Repair	DNA repair are several mechanisms by which a cell maintains the integrity of its genetic code. At least five major DNA repair pathways Base excision repair (BER) nucleotide excision repair (NER).	3
Unit II	Prokaryotic Transcription	Prokaryotic transcription is the process in which messenger RNA transcripts of genetic	3

		material in prokaryotes are produced.	
		to be translated for the production of proteins.	
	Eukaryotic transcription	Eukaryotic transcription is carried out in the nucleus of the cell and proceeds in three sequential stages.	3
		Initiation, elongation & termination.	
Unit III	Genetic Code	The genetic code is a set of three letter combinations of nucleotides called codons.	2
Unit IV	Protein Biosynthesis	Protein synthesis is the process in which cells make proteins. It occurs in two stages: transcription and translation.	3
		These are three stages of protein biosynthesis initiation, elongation and termination.	
Unit V	Regulation of expression in prokaryotes	The regulation of gene expression in prokaryotic cells occur at the transcriptional level.	2



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Winter
 Session 2022-2023 (~~Summer~~ Session)
 Department Name: Biotechnology
 Course Name: M.Sc. I Sem
 Subject:-
 Faculty:- Aashika Phage

Cell Biology and Enzymology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Plasma membrane	The plasma membrane also called the cell membrane is the membrane found in all cells that separates the interior of cell from outside environment.	3
		Provides shapes, support and protection to the cell and its organelles.	2
		known as "powerhouse of the cell" mitochondria produce the energy necessary for the cells survival and functioning. mitochondria break down glucose into an "energy" molecule known as ATP.	2
Unit II	Cell cycle	during G ₁ phase CDKs are inactive due to low cyclin levels and the presence	3

		of CKIs. A cell cycle is a series of events that takes place in a cell as it ^{grows &} divide.	
	Cell Signaling	Cell signaling is the process by which a cell interacts with itself other cells and the environment. Cell signalling is a fundamental cellular life in prokaryotes & eukaryotes.	4
Unit III	Basic Enzymology	a branch of biochemistry that deals with the properties activity and significance of enzymes. Enzymes are protein that help speed up chemical reaction in our bodies.	3
Unit IV	Enzyme Engineering	Enzyme engineering is the process of improving the efficiency of an already available enzyme or the formulation of an advanced enzyme activity by altering its amino acid sequence.	2
	Immobilization of enzymes	The term immobilized enzymes refers to enzymes physically confined or localized in a certain defined region of space with retention of their catalytic activities and which can be used repeatedly and continuously.	2
Unit V			

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Winter

Session 2022-2023 (Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. I Sem

Subject:-

Faculty:- Vaishnavi Karde

Biomolecules

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Chemistry of carbohydrates	A carbohydrate is a naturally occurring compound or a derivative of such a compound with the general chemical formula $C_x(H_2O)_y$ made of molecules of Carbon (C) Hydrogen (H) and Oxygen (O).	3
	Glycolipids	Glycolipids are lipids with a carbohydrate attached by a glycosidic (covalent) bond.	2
	Proteoglycans	A proteoglycan is a macromolecule that has a core protein with one or more glycosaminoglycan chains. Proteoglycans are a type of glycoproteins present in the body especially in connective tissues, bone and cartilage and cell surfaces.	2
Unit II	Chemistry of lipids	Lipids are heterogeneous group of compounds, mainly composed of	3

	Lipids	hydrocarbon chains.	
	Lipoproteins	Lipoproteins are round particles made of fat (lipids) and proteins that travel in your blood stream to cells throughout your body.	3
Unit III	Proteins	A protein molecule is made from a long chain of these amino acids, each linked to its neighbor through a ^{covalent} peptide bond.	2
Unit IV	Nucleic acids	Nucleic acid are biopolymers, macromolecules, essential to all known forms of life.	3
	Structure of DNA	DNA is made of two linked strands that wind around each other to resemble a twisted ladder - shape known as double helix.	2
Unit V			

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Winter
 Session 2022-2023 (~~Summer~~ Session)
 Department Name: BioTechnology
 Course Name: M.Sc. I Sem
 Subject:- _____
 Faculty:- Arijali Chalpe

Biophysical Techniques

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Spectrophotometry	spectrophotometry is a method to measure how much a chemical substance absorbs light	2
		by measuring the intensity of light as a beam of light passes through sample solution.	
	Fluorescence Spectrophotometry	Fluorescence is a type of luminescence caused by photons exciting a molecule, raising it to an electronic excited state.	3
Unit I	Mass Spectrometry	Mass Spectrometry is an analytical tool useful for measuring the mass to charge ratio (m/z) of one or more molecules present in a sample.	3
Unit II	Chromatography	Chromatography is a process for separating components of a	2

		mixture.	
	Gel filtration	Gel filtration (GF) chromatography separates proteins solely on the basis of molecular size.	2
Unit III	Electrophoresis	Electrophoresis is a laboratory technique used to separate DNA, RNA or protein molecules based on their size and electrical charge.	2
Unit IV	Centrifugation	centrifugation is a method of separating molecules having different densities by spinning them in solution around an axis at high speed.	2
	Types of Centrifuge	There are two types of centrifugal techniques for separating particles differential centrifugation and density gradient centrifugation.	2
Unit V			

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Session 2022-2023 (Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. II sem

Subject:-


Faculty:- Pamini Dambhale

Applied Molecular Biology

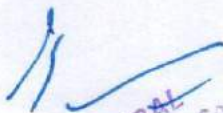
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Homologous recombination	Homologous recombination is a type of genetic recombination in which nucleotide sequences are exchanged between two similar or identical molecules of DNA.	2
	Molecular Mapping of genome.	Molecular mapping aids in identifying the location of particular markers within the genome.	3
	AFLP analysis	Amplified fragment length polymorphism (AFLP) analysis is a universal polymerase chain reaction (PCR) based DNA fingerprinting technique.	2
Unit II	Antisense and	Antisense oligonucleotides block translation of the mRNA or induce its degradation by RNase H, while Ribozymes and	2

	Ribozymes technology	DNA enzymes possess catalytic activity and cleave their target RNA.	2
	Epigenetics	Epigenetics is the study of how your behaviours and environment can cause changes that affect the way your genes work.	2
Unit III	Cancer Biology	Cancer is a disease caused when cells divide uncontrollably and spread into surrounding tissues. Cancer is caused by changes to DNA.	3
Unit IV	Angiogenesis	Angiogenesis is the formation of new blood vessels. This process involves the migration, growth and differentiation of endothelial cells, which line inside wall of blood vessels.	3
	Metastasis	Metastasis is the movement or spreading of cancer cells from one organ or tissue to another.	2
Unit V			


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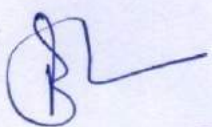
Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: MSE II sem
Subject:- Microbiology
Faculty:- Vaibhavi ughade

Microbiology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Algae	Algae are photosynthetic organisms	3
		algae can be either unicellular or multicellular organisms.	
	Viruses	They are small, have DNA or RNA genomes and are obligate intracellular parasites	2
Unit I	Viroids	Viroids are infectious agents that consist only of naked RNA without any protective layer such as a protein coat.	2
		Viroids infect plants (but no other forms of life) and are replicated at the expense of the host cell.	
Unit II	Prokaryotes	Prokaryotes are organisms whose cells lack a nucleus and other organelles proka-	4

		Notes are divided into two distinct groups the bacteria and archaea.	
	Bacterial Genetic System	Bacterial genetics is the study of the transfer of genetic information of genetic information in bacteria. Explore bacterial conjugation, transformation & transduction.	3
Unit III	Microbial Physiology	Microbial physiology is defined as the study of how microbial cell structures, growth & metabolism function in living organisms.	2
Unit IV	Concept of Chemotherapy	Chemotherapy is a drug treatment that uses powerful chemicals to kill fast growing cells in your body. Chemotherapy is most often used to treat cancer.	2
	Drug Resistance	Drug resistance occurs when a cell or bacteria becomes less sensitive to a specific drug.	2
Unit V			



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Session 2022-2023 (Summer Session)

Department Name: Biotechnology

Course Name: M.Sc II sem

Subject:-

Faculty:- Rakeshanda Nagare

Immunology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Primary Lymphoid organs	These organs include the bone marrow & the thymus. They create special immune system cells called lymphocytes.	3
	Secondary Lymphoid organs	These organs include the lymph nodes, the spleen, the tonsils and certain tissue in various mucous membrane layers in the body (for instance in the bowel).	3
	Microarrays	A microarray is a laboratory tool used to detect the expression of thousands of genes at the same time.	2
Unit II	Immunoglobulins basic	Immunoglobulins are heterodimeric protein composed of two heavy (H)	2

	Structure	and two light (L) chains.	
	Immune mediated immune responses	Cell mediated immunity or cellular immunity is an immune response that does not involve antibodies. Helper T cells, killer T cells, & macrophages are the three main kinds of lymphocytes involved in cell mediated immunity.	3
Unit III	Active & Passive Immunization	Active immunisation uses vaccines to induce an immune response in the person receiving the vaccine. Passive immunization is the direct transfer of antibodies to a non-immune person to provide temporary protection.	2
Unit IV	Hypersensitivity	Hypersensitivity reactions are inappropriate immunologic responses occurring in response to an antigen or allergen.	4
	Cancer Immunotherapy	Cancer immunotherapy is the stimulation of the immune system to treat cancer.	3
Unit V			

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Session 2022-2023 (Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. II sem

Subject: Biotechnology

Faculty: Sandip Petale

Fundamentals of genetic Engineering

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Restriction Endonucleases	Restriction endonucleases are enzymes that recognize a specific DNA sequence, called a restriction site and cleave the DNA within or adjacent to that site.	2
	Exonucleases	Exonucleases are nuclease which cut off nucleotides from 5' or 3' ends of DNA molecule.	2
	Topoisomerase	Topoisomerases are nuclear enzymes that play essential roles in DNA replication transcription chromosome segregation and recombination.	3
Unit II	Construction of genomic	DNA libraries are constructed by partially cutting the genome of interest with a	3

	DNA Library	restriction enzyme to generate large fragments inserting each of the fragments into a vector and the putting each vector into a bacterial cell.	3
	DNA sequencing	DNA sequencing is the process of determining the nucleic acid sequence the order of nucleotide in DNA. It includes any method or technology that is used to determine the order of four bases: adenine, guanine, cytosine and thymine.	3
Unit III	Boyer Cohen cloning experiment	after preliminary experiments in 1973; the Cohen-Boyer team was able to cut open a plasmid loop from one species of bacteria insert a gene from different bacterial species & close the plasmid.	3
Unit IV	Cloning Vector	A cloning vector is a small piece of DNA that can be stably maintained in an organism and into which a foreign DNA fragments can be inserted for cloning purposes.	2
	Yeast Artificial Chromosome	Yeast artificial chromosome (YAC) is a human Engineered DNA molecule used to clone DNA sequences in yeast cells.	2
Unit V			

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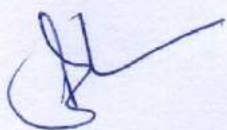
Session 2022-2023 (^{Winter} Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc. (Sem III)
 Subject:-
 Faculty:- Vaibhavi Waghade

Diagnostic medical Biotechnology

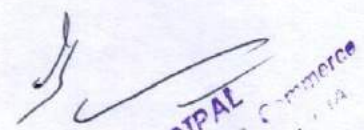
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Host pathogen Interaction.	Microbes or viruses sustain themselves within host organisms on molecular cellular, organism or population level.	02	
		ever emerging and evolving field in discipline of plant pathology diagnosis is hypothesis about the nature of patient illness one that derived from	02	
	Disease diagnosis of disease	Observation by use of interference. taking medical history, performing physical exam, obtaining diagnostic tests. BLAST is tool one of most widely used tools to gain sequence information finding similarity between DNA & protein sequence against database is one of first thing people do when trying to get immediate about a	03	
		Sequence of interest.		
	Unit II	Human disease gene.	The complete human genome sequence	02

	Polymorphism	It is popular concept in programming referring to idea that an entity in code such as variable, function or object can have more than one form.	
Unit III	Proteomics	Proteomics is the large-scale study of proteins. Proteins are vital parts of living organisms, with many functions.	
Unit IV	mass spectrometry	It is an analytical tool useful for measuring the mass-to-charge ratio of one or more molecule present in a sample.	
	nanodiagnos- tics	It involve the use of nanotechnology in biomedical diagnostics	
Unit V		microchips, biosensors, nanorobots.	
		we in this nanodiagnostics,	



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Winter
 Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc (Sem III)
 Subject:-
 Faculty:- Rakeshanda Hegurale

Genetic Engineering & its Application

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Transformation	DNA uptake by bacterial cells,	02
		Remove plasmid from bacterial cells, isolate gene of interest, cut open plasmid with restriction enzyme, insert gene of interest, insert into it.	
		Recombinant DNA, bacteria produce itself.	03
	Transformation	chemical & physical methods, viral vectors, polyethylene glycol, calcium phosphate, coprecipitation, dimethyl sulfoxide, liposomes, microinjection	
		electroporation, Somatic cell fusion,	
		gene transfer, pronuclear microinjection	02
	Amplification of DNA	polymerase chain reaction, Denaturation annealing, extension.	
		DNA with repeated cycling at different temperature.	
Unit II	plant transformation technology	Basic of tumor formation hairy root feature of Ti & Ri plasmid.	02

	Scaffold attachment region.	Use of reporter gene, methods of nuclear transformation, viral vectors	03	
		Biophysical and biological transformation method.		
Unit III		Expression of heterologous gene	Expression of eukaryotic genes in bacteria, expression of heterologous gene in yeast, insect & mammalian cells.	02
			Production of monoclonal antibodies by phase display technique using filamentous phage vectors.	03
Unit IV	Gene therapy		Somatic cell germline, gene replacement in vivo & ex vivo	02
		gene transfer, adeno-associated virus herpes virus vectors		
Unit V		gene correction, replacement editing.		

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Winter
 Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc. (Sem III)
 Subject:-
 Faculty:- Sandip Petare
Plant Biotechnology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Conventional plant breeding	It achieve by crossing together	02
		plant with relevant characteristics and	
		Selecting the offspring with desired combination of characteristics.	
	Tissue culture medium	Tissue culture media is the source through which your	03
		plant receive nutrients for good and healthy growth. It is combination of different components which provides diff. nutrients.	
		The process of formation of organs	
Organogenesis & embryogenesis	from three germ layer. It concern cell-cell interaction	04	
	fertilization of an ovule to produce fully developed plant embryo		
Unit II	Shoot tip culture.	Shoot tip culture isolate from	02
		plant can multiply in the form of	

		like body, axillary bud or shoot	
		primordium and regenerate clone plants	
	Production of haploid plants.	Haploid plants originate from the gametes that do not go through fertilization but can still generate viable individual.	02
Unit III	Application of plant transformation	To improve the plant yield quality and tolerance to abiotic/biotic stress, to express the diff protein like cry protein.	03
Unit IV	Plant metabolic	plant secondary metabolites control metabolites & manipulation of phenyl propanoid pathways, alkaloids purification strategies	04
	molecular markers aided breeding	RFLP maps, linkage analysis. RAPD markers, STS, microsatellites	02
Unit V	breeding	SSCP, QTL, map based cloning	

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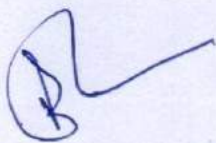
Winter
 Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: Msc (Sem III)
 Subject:- _____
 Faculty:- Ruchika Rewatkar

Environmental Science & Bioresources

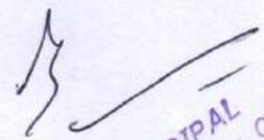
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Introduction to environmental science.	Basic principle of ecology and environmental science as well as ethics, geography anthropology public policy, political science, urban planning economics, philosophy.	02	
		Air, water pollution.	Contamination of air, due to presence of substance in the atmosphere that are harmful to health of human & other living burning fossil fuels, harmful gases Sulphur dioxide carbon monoxide, soil erosion is another major factor that causes thermal.	03
			Soil thermal pollution	As bodies of water are more exposed to sunlight soil erosion is the gradual wearing away of top soils from the land deformation, urban runoff,
	is the gradual wearing away of top soils from the land deformation, urban runoff,			
	Unit II	abiotic & biotic	Biotic factors are living thing within	01

		an ecosystem such as plants, animals and bacteria, while abiotic are non living components.	
	Biochemical cycle.	The movement of nutrients & other elements between biotic & abiotic factors external transfer of elements among diff. components of forest system	02
Unit III		Biofertilizer	Substance that contains microbes, which help in promoting the growth of plants & stress by increasing the supply of essential nutrients to the plants
			Substance that contains microbes, which helps in promoting the growth of plants & stress by increasing the supply of essential nutrients of the plants.
Unit IV	Bioremediation		03
			04
Unit V			



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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc (Sem IV)
 Subject:-
 Faculty:- Sandip Petare

Animal Biotechnology

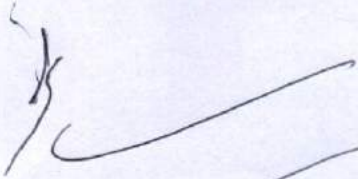
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Animal cell culture.	Equipment and material for animal cell culture technology	04
		In vitro maintenance & proliferation of animal cells that will continue to grow, outside the living organisms if supplied with appropriate growth condition, to grow	
	culture medium	outside the living nutrients & used to grow bacteria or m.o. It should be sterile and isotonic to culturing cells physiological pH and osmolarity required to maintain animal culture medium.	02
		cell line characterization involves morphological, biochemical and gene based characterization the species of origin, tissue of origin cell line and nature of cell line have to be identified.	
	characteristics of cell in culture.	The cell culture as to wheather cells are obtained diredly from animal tissue.	02
		The cell culture system is formed by culture cells directly obtained.	
Unit II	Primary culture.		

	Established cell line culture.	from tissue.	
		culture will proliferate indefinitely given appropriate fresh medium.	03
	Measurement of Viability & cytotoxicity	A cell viability assay measures the number of living cells in sample	
Unit III	Scaling up of animal cell culture.	Scale up involves the development of culture systems in stages from laboratory to industry.	02
	Stem cell culture.	Stem cell have remarkable potential to renew themselves. There are several categories pluripotent stem cell, adult stem cell.	02
Unit IV	Commercial application of cell culture.	model systems, toxicity testing, cancer Research, virology, Genetic counselling Gene therapy.	
	Three dimensional	3D cell culture is culture environment that allows cells to grow and interact with surrounding extracellular framework.	03
Unit V	cultures of tissue engineering.	assemble functional constructs that restore, maintain or improve damaged tissue or whole organs.	02


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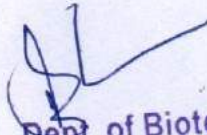
Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc. (Sem IV)
 Subject:-
 Faculty:- Anjali Chalape

Biostatistics, Bioinformatics, Ethics & patenting


Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Biostatistics measure of dispersion.	It is branch of statistics that applied statistical methods to wide range of topics in biology	02
		collection and analysis of data.	
	Research design.	Overall strategy and analytical approach that you have chose in order to integrate the different components of study investigate.	03
	Phylogenetic clustering	It contain sequence from different patients, which shares recent common ancestor. These clusters are manifest as grouping in phylogenetic tree in which phylogenetic clustering is the study	02
Unit II	Bioinformatics.	of structure behaviour interaction	04
		of natural and engineered computational system.	

	Bioinform- atic tool	It is aid to comparing analyzing and interpreting genetic and genomic data and more generally understanding molecular biology.	02
Unit III	Benefits of Biotechnology	Genetically modified crops, zero waste bioprocessing, carbon dioxide as raw material and many more.	03
Unit IV	Patent & trademark	A patent protects new inventions processes or scientific creations.	02
		trademark protects brands logos & slogans.	
	IPR	patent, copyright, industrial design. rights, trademark, geographical indication.	03
Unit V			


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Session 2022-2023 (Summer Session)
 Department Name: Biotechnology
 Course Name: M.Sc (Sem IV)
 Subject:-
 Faculty:- Ruchika Rewatkar

Applied Environmental Biotechnology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Bio remediation	Branch of biotechnology that	
		employ use of living organisms like microbes and bacteria to decontaminated affected areas	02
	Vermicomposting	Convert the organic waste into	
		manure rich in high nutritional content.	02
Phytoremediation	The treatment of pollutants or		
	waste contaminated soil by use of	03	
	greenhouse plants that remove degrade stabilize undesirable substances.		
Unit II	Bioremediation	It is process by which organic	02
		material is microbiologically convert,	

		under aerobic condition to biogas.	04
	Bioleaching	The process of extracting metal from ores or waste by using microorganism to oxidize the metals.	02
Unit III		Waste water treatment	It is process which removes & eliminates contaminants from wastewater & convert this into effluent.
			03
Unit IV	Xenobiotics	It is chemical to which an organism is exposed that are extrinsic to normal metabolism of that organism.	02
		Pesticides	This are the substances that are meant to control pests, bactericides, animal, repellent, etc.
Unit V			

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COLLEGE,** AT POST HALWADI, DIST. WARDHA (M.S.)
Accredited 'B' by NAAC

Approved by government
of Maharashtra

Affiliated to Rashtrasant Tukadoji
Maharaj Nagpur University, Nagpur

Recognised by U.G.C New Delhi
under section 2 (f) & 12 (b) of
UGC act 1956

Session 2022-2023 (Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. (Sem IV)

Subject:-

Faculty:- Vaibhavi Ughade

Therapeutic Medical Biotechnology

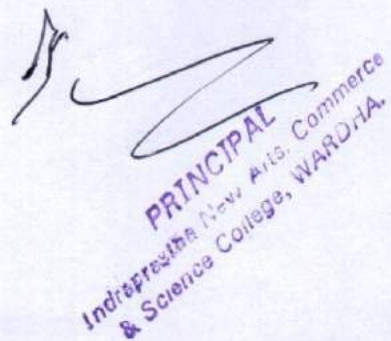
Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Gene therapy	It is technique that modifies a person's gene to treat or use disease by replacing disease causing gene.	01
		Transplantation is surgical procedure in which organ tissue or group of cell removed from one person to other.	02
		It can be important for transgenesis gene therapy. where new gene can be inserted into patients to fix genetic disorder, genes that are transplanted or moved from one to another organisms.	03
	Tissue & organ transplantation.	The study of how genes affects a person's response to drugs person,	02
		Pharmacogenomics	

		genetic make up.	
	Pharmacodynamics	It is the study of drug's	02
		molecular biochemical & physiologic effects or actions.	
Unit III	Nanobio-technology	field of science that introduce	01
		special physicochemical & biological	
		properties & nanostructures & their	
		application in various areas.	
Unit IV	Drug discovery	The process of identifying chemicals	02
		entities that have potential to	
		become therapeutic agents, pre clinical	
	clinical trial.	phase & Regulatory approach.	02
Research study that test a medical			
Unit V		surgical or behavioral intervention in	
		people.	



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Session 2019-2020 (Summer Session)
Department Name: Biotechnology
Course Name: B.Sc 4th sem
Subject:- Biotech Paper - I
Faculty:- Pooja Thote

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	History and Development of microbiology	As microorganism are too	03
		small to be seen naked eye	
		it was obvious that their discovery	
	Theory of Biogenesis and abiogenesis	Theory of abiogenesis or spontaneous	02
		generation. Acc. to them to this	
		theory it is believed that life	
John Tyndall	In 1876 John Tyndall	03	
	an English physicist supported		
	the pasteur view that dust		
Unit II	Bacteria	partly carry the microorganisms	03
		The bacterial cell-the	
		evolutionary history of prokaryotic	
		cell extend back 3.5 billion years	

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	Variouly shaped and arranged may found in Bacte	Bacteria come in variety of shape and arrangement. These characteristics are particularly	2
Unit III	Berg's manual	It is generally recognized that ultimate aim of any taxonomy of any group of organs	3
Unit IV	Principle of nutrition	Chemical analysis of microbial cell. the chemical composition of any cell whether prokaryotic or eukaryotic.	
Unit V			

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Session 2019-20 (Summer Session)

Department Name: Biotechnology
Course Name: B.Sc 1st Sem
Subject: Biotechnology, Paper-II
Faculty: Pooja Thote

Lesson Plan format

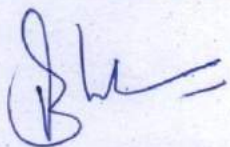
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Nucleic Acids	Chemical structure and base	3
		Composition of nucleic acid, Chargaff's rules	
		Watson Crick model (B-DNA), deviations from Watson-Crick model Other forms of DNA (A and Z-DNA)	02
		Forces stabilizing nucleic acid	
		Structure: Maxam and Gilbert DNA	03
		Sequencing, structure of t-RNA	
Unit II	Chromosomes	Concept of prokaryotic gene and eukaryotic gene. Definition of gene.	02

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		Concept of split genes, introns, exons, spacers, c-value and C-value Paradox.	
	Concept of Genes and Nucleosomes	chromatin structure: Nucleosome, structure 10mm fibre, experiment leading to discovery of nucleosomal chromatin structure.	
Unit III	Amino Acid	Structure of amino acid occurring in protein, classification of amino acid.	03
Unit IV	Secondary structure of Proteins	The α -helix, β -structure (parallel, antiparallel, mixed β -turn)	04
		Tertiary structure of Protein - forces that stabilize the structure.	
		Quaternary structure of Protein: - force stabilizing quaternary structure	
Unit V			


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Session 2019-20 (Summer Session)

Department Name: Biotechnology
 Course Name: B.Sc IInd Sem
 Subject:- Biotechnology Paper-I
 Faculty:- Pallavi Chaudhore

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Growth Rate and generation time	The generation time is the time that it takes for bacteria to divide.	2
		To convert this to Growth rate, simply divide 0.301 by the Generation time	
	Growth rate and various phase	Growth rate are computed by dividing the value and difference between the ending and starting values	3
Physical condition required for growth	Temperature of Bacteria can live in hotter and colder temperatures than humans, but they do best in warm moist, protein-rich environment that is pH.	2	
Unit II	Microbiol Control	Control of microbial growth means to inhibit or prevent growth of	1

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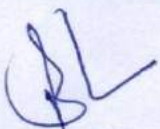
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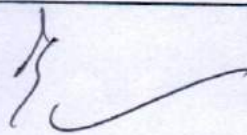
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		microorganisms. This control is affected in two basic ways. 1) By killing microorganism.	
	Mechanism of cell Injury	In the first cell damage is manifested by cytoplasmic swelling plasma membrane dilation of endoplasmic reticulum and mitochondria	3
Unit III	Eukaryotic cell	Eukaryotic cells have a nucleus enclosed within the nuclear membrane and form large and complex organisms.	4
Unit IV	Plant cell wall	The plant cell wall is an elaborate extracellular matrix that encloses each cell in plant.	3
	Mitosis and Meiosis	Meiosis is a special type of cell division in germ cells and apicomplexans.	3
Unit V			


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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: A. Sc II sem

Subject:- Biotechnology Paper I

Faculty:- palavi chadbur

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Carbohydrate 1) classified 2) Nomenclature	Carbohydrate also called are	2
		type of macromolecules found in certain food and drink	
		Carbohydrate are divide into	3
		five types: Monosaccharide, disaccharide and Polysaccharide	
		Carbohydrates can be divide	3
		into two main types simplex and complex	
Unit II	Lipid of Type of Lipid	Type of Lipid structure of saturated and unsaturated	2

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		unsaturated, fatty acids	
		triglyceride, phospholipid	
		plasmogens, glycoside and	3
		sphingolipids, Terpenoids and	
		Isoprenoids - definition and	
		representative	
Unit III	Enzyme	Terminology: Active site,	
		allosteric site, Holoenzyme,	4
		apo-enzyme, coenzyme, substrate	
Unit IV	Assay of enzyme	concept of activity, specific	3
		activity, turnover number,	
		units of enzyme activity	
		spectrophotometric method,	
		Enzyme kinetic - Michaelis -	
		menten equation	
Unit V			

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Session 2019-2020 (Summer Session)
Department Name: Biotechnology
Course Name: Bsc III sem
Subject:- Biotechno
Faculty:- Pallavi Chaudhari

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	spectrophotometry.	concept of electromagnetic radiation spectrum of light.	3.	
		Absorption of electromagnetic radiation.		
		concept of chromophores	Auxochrome, involvement of orbitals in absorption of electromagnetic radiation.	4
	Absorption spectrum.	Its uses, Beer's law		
		derivation and deviation, extinction coefficient. Difference between spectrophotometer and colorimeter.	2	
	Unit II	Application of U.V	U.V radiation is widely used in industrial processes and in medical and dental practices.	3.

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		killing bacteria, creating.	
	Principle of IR	The IR spectroscopy theory utilizes the concept that molecules tend to absorb specific frequencies of light.	2
Unit III		Chemical analysis chromatography is a laboratory technique for the separation of a mixture	3
		Gel filtration is also known as size exclusion chromatography molecular sieve chromatography.	4
Unit IV	ion exchange	Ion exchange is a reversible interchange of one kind of ions.	2
Unit V	affinity chromatography	It is a separation method based on a specific binding interaction between an immobilized	3
	elements of High pressure	Examines its effects on nutrients and the design and construction.	

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: BSC IV sem

Subject:- Biotechnology paper II

Faculty:- Pooja Thote

Lesson Plan format

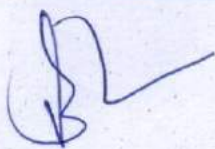
Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Migration of ions in electric field	factors affecting electrophoretic mobility. the movement of ions due to an externally applied	03	
		Paper electrophoresis employs filter paper strips soaked in buffer solution, usually.	02	
		DNA electrophoresis is a standard laboratory technique used to identify, quantify, and purify DNA fragments, DNA electrophoresis involves loading DNA samples into the wells	04	
	Unit II	SDS PAGE.	sodium dodecyl-sulfate polyacrylamide gel electrophoresis (SDS-PAGE)	05

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	Isoelectric focussing	It is an electrophoretic technique for the separation of amphoteric analytes according to their isoelectric point (pI) by the application of an electric field along a pH gradient formed in a capillary.	03
	pulsed field gel electrophoresis		03
Unit III	Isotopic tracers	Isotopic tracers are radioactive atoms detectable in a material in a chemical biological. stable isotopes ratios are measured using mass spectrometry, which separates the different isotopes of an element on the basis of centrifugation is a method of separating molecules having different densities by spinning.	04
Unit IV	Measurement of stable isotopes		02
	centrifugation		03
Unit V	Analytical centrifugation	Analytical ultracentrifugation is an analytical technique which combines an ultracentrifuge with optical monitoring.	02
	Biostatistics	Biostatistics is a branch of statistics that applies statistical methods.	04


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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: BSC IV sem

Subject:- Biotechnology paper I.

Faculty:- Shubhangi Vishette.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Immune System	The immune system is a complex network of organs, cells and proteins that defends the body	04	
		In innate immune responses are the first line of defense against invading pathogens.	03	
		Humoral immunity. It is the aspect of immunity that is mediated by macromolecules - including secreted antibodies, complement proteins.	02	
	Unit II	Antibody structure	An antibody has a Y-shaped structure, made up of four	03

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	classes	polypeptide subunits. IgA, IgD, IgE, IgG, IgM.	
	cell mediated immunity.	cell mediated immunity or cellular immunity is an immune response that does not involve antibodies. cell mediated.	03
Unit III	Hypersensitivity.	Exaggerated or inappropriate immunologic responses occurring in response to an antigen or	03
Unit IV	Vaccination	Vaccines reduce risks of getting a disease by working with your body's natural defences to build protection.	04
	immunological techniques	Immunological techniques include both experimental methods to study.	05
Unit V	Hybridoma Technology	Hybridoma is a culture of hybrid cells that results from the fusion of B cells and myeloma.	05
	EISA.	The enzyme linked immunosorbent assay is a commonly used.	04

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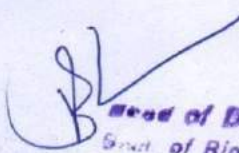


Session 2019-20 (Summer Session)

Department Name: Biotechnology
Course Name: BSC. 1st sem
Subject:- microbiology I
Faculty:- Suvarnd telekandhe

Lesson Plan format

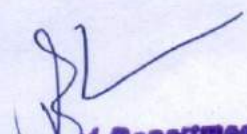
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	History of microbiology	Fundamentals of microbiology. History of microbiology .	02
		1) Discovery of microbes 2) Theory of biogenesis .	
		3) contributions of - Antonie van Leeuwenhoek, Louis Pasteur,	
	Robert Koch Rivers	4) Robert Koch, Joseph Lister, Winogradsky, Beijerinck, John T. Thomas, M. Rivers,	04
		4) Branches of microbiology - Definition and scope of a) systemic microbiology b) bacteriology . c) Geo microbiology d) Exobiology .	03
	Branches of microbiology	e) medical microbiology f) Environmental microbiology.	
g) Industrial microbiology.			
h) food microbiology .			
Unit II	Bacterial cell cultures	Bacterial cell cultures . 1) Differences between prokaryotes and eukaryotes . 2. description of size, shapes .	04


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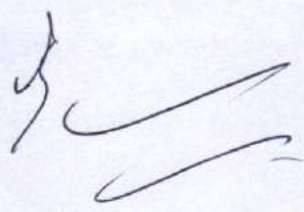



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		3) Typical Bacterial cell culture	
		4) Ribosomes, Nucleoid, Plasmid	
		5) capsules, Slime layer, Pili?	03
	Formation of Spores	6) Endospores, myxospores.	
		7) Exospore & Dormancy.	
		1) Nutritional types of Bacteria	
		2) Basic Nutritional Requirement	
		3) Types of media	
		4) media for Isolation of fungi.	
		5) Enrichment culture.	
Unit III	Microbial interaction	Microbial Interactions	
		1) Positive & negative interaction.	04
		2) Protist - Protist interaction.	
		3) Protist - Plant interaction.	
		4) Protist - Animal interaction.	
Unit IV	Types of bacteria	midgut bacteria, luminescent bacteria.	
Unit V			


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Session 2019-20 (Summer Session)

Department Name: Biotechnology
 Course Name: BSC 1st sem
 Subject:- Microbiology Paper II
 Faculty:- Pooja Thote

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	microscopy	History of microscopy	04
		principles and working of microscope	
	Types of microscope	Bright field microscopy	
		Compound microscopy	04
		Transmission electron microscopy	
	Application	phase Contrast microscopy	
		Construction and operation	03
	Application of fluorescence microscopy		
Unit II	Stains and dyes	stains and dyes	02
		chromophore, auxochrome	

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		Anomogens	
	classification of dyes	Theories of staining	
		Simple staining	02
		Gram and acid fast staining.	
Unit III	Replica plating	Nutritional requirements	02
		Replica plating technique	
Unit IV	Physical and chemical agents	Short term preservation method	
		High temperature, moist heat	03
		dry heat, low temperature filtration, radiation, osmotic pressure, phenolic compounds.	02
	Other Compounds	Quaternary ammonium compounds	
		antibiotic, mechanism of cell injury	
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
 Course Name: Bsc 2nd sem
 Subject:- Microbiology I
 Faculty:- Vaibhav Ugrdate

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Proteo- bacteria	Proteobacteria is a major	06
		phylum of gram-negative bacterium	
		including pseudomonada.	
	Actinomyces and Acetobacter bacteria	Characteristics of Streptomyces	05
		and their application types of acetobacter bacteria	
	Cyanobacteria	Cyanobacteria commonly	04
known as blue green algae.			
gram-negative, prokaryotes			
Unit II	Eukaryotic microbes	perform oxygenic photosynthesis	03
		Fungi and yeast - general characters, cellular and	

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		Sexual mode of reproduction	
	Algae and protozoa	General character and evolutionary important algal cells.	05
		General character and life cycle of Entamoeba histolytica.	
Unit III	Acellular microbes	Discovery of viruses, symmetry, cultivation of chick embryo and tissue culture methods.	04
Unit IV	Positive and negative interaction	Commensalism, synergism, syntrophism, metabolism, parasitism, antagonism, competition.	04
	Prokaryot - prokaryot, plant - animal	Prokaryot - prokaryot interaction, prokaryot - plant interaction, prokaryot - animal interaction.	05
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: Bsc 1st Sem

Subject:- Microbiology-II

Faculty:- Shubhangi Wadhe

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	classification of food	classification of food on basis	05
		of ease of spoilage and time of spoilage	
	spoilage of vegetables	factors responsible and	04
		types of spoilage due to presence of air high humidity	
	spoilage of products	factors responsible and types	04
		of spoilage, spoilage of meat and meat products spoilage of canned foods.	
Unit II	Types of food preservation	General types of food preservation preservation by physical methods	02

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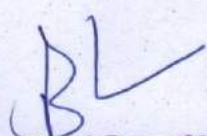
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		By high temperature	
	preservation by chemical preservatives	Acetates, Citric acid, lactic acid, propionates, sorbates, nitrites, salt and sugar.	0.3
Unit III	milk microbiology	Composition of milk Sources of microorganisms in milk MBRT	0.2
Unit IV	Food poisoning	Food intoxication and food infection, clostridium, staphylococcal enterotoxin poisoning.	
	objectives of FSSAI	Intro to FDA, BIS, FSSAI objectives and responsibilities.	0.1
Unit V			


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Session 2019-20(Summer Session)

Department Name: Biotechnology
 Course Name: BSC ITADSEM
 Subject:- Microbiology paper I
 Faculty:- Suvaina Telbandhe

Lesson Plan format

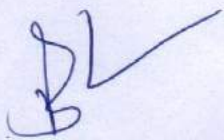
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Carbohydrate	classification of carbohydrates	04
		structure of glucose, fructose	
		maltose	
	Amino acid and protein	classification of amino acid	05
		titration curve, acidic, basic	
		neutral dye	
	Amino acid classification	Aromatic amino acids	03
		Basic amino acids	
		glycine, phenylalanine, tyrosine	
and leucophan.			
Unit II	Enzymology	definition of enzyme	05
		classification and nomenclature	

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		Enzyme kinetics.	
	Enzyme properties	E.S complex, Enzyme inhibition and their types, allosteric sites, allosteric modulators membrane bound enzyme	06
Unit III	Classification of lipids	Classification of lipid, triglyceride compound lipids and derived lipids.	05
Unit IV	Nucleic acid and vitamins	Structure of purines and pyrimidines Nucleosides and nucleotides Structure of DNA and RNA	06
	Vitamins	Hypovitaminosis and hypervitaminosis classification of vitamins.	03
Unit V			



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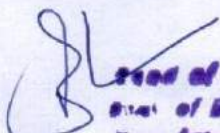


Session 2019-20^{winter} (Summer Session)

Department Name: Biotechnology
Course Name: Bsc IT edition
Subject:- Microbiology II
Faculty:- Pooja Thote

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Fermenter	Types of fermenters, parts of fermenter, fermentation process	04
		Types of fermentation process	03
	History and scope of Industrial microbiology	Pasteurization method	04
		scope - creation of industrial products cheese, yogurt etc	
Unit II	upstream process	Comprises tasks in the initial stages of fermentation process	03


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		in biotechnology this includes steps related to microorganisms.	
	Scale up fermentor	Scale up fermentor is used to demonstrate fermentation production at large scale results in some productivity	05
Unit III	Downstream processing	Describes the series of operations required to take biological materials such as cells	04
Unit IV	Production biochemistry	Purification of cells Production of insulin Production of SCP	03
	Entrepreneurial microbiology	Beer and wine production Citric acid production.	03
Unit V			

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Session 2019-20(Summer Session)

Department Name: Bio-Technology

Course Name: BSC 4th Sem

Subject:- Microbiology - I

Faculty:- Vaibhavi Vaghade

Lesson Plan format

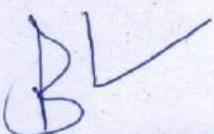
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Carbohydrate	general strategy of metabolism	04
		mechanism of metabolism	
		by various cycles.	
	EMP and TCA cycle	EMP pathway and its regulation	03
		TCA pathway and its	
		regulation.	
Pentose phosphate pathway	multienzyme pathway that	03	
	share a common starting		
	molecules with glucose and glucose-6-phosphate.		
Unit II	lipids	Betaoxidation and omegaoxidation	04
		Replication of DNA, modes	

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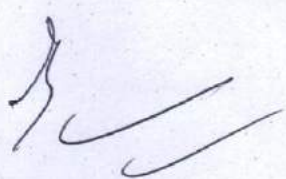


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		models of replication	
	nucleic acid	Rolling circle, knife fork model prokaryotic transcription including general features enzymes involved.	05
Unit III	Amino acid and proteins	Amino acid breakdown deamination, metabolic breakdown.	05
Unit IV	Energy generation	High energy molecules substrate level phosphorylation cyclic and non cyclic phosphorylation.	04
		oxidative phosphorylation and ATP generation.	03
Unit V			


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Session 2019-20(Summer Session)

Department Name: Biotechnology
 Course Name: BCC 4th sem
 Subject:- microbiology paper II
 Faculty:- Shubhagi Musket

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Fresh water	Example of fresh water ice sheets, ice caps, glaciers, icebergs.	03	
		Potable water	water treatment using RSP and SFP methods of chlorination.	03
			microbiological quality testing.	significance of bacteriological analysis of water, collection and handling of water samples
	indicators of excretal pollution.			
	Unit II	Air microbiology	significance of microbial analysis of air, settling plate	02

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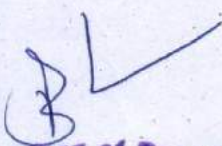
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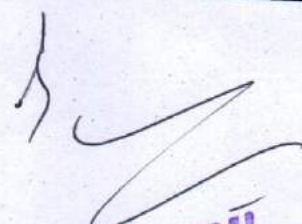
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		and Anderson technique.	
	Agriculture microbiology	Symbiotic, Nitrogen fixing bacteria, mechanism of nitrogenase	04
		Enzyme formation of yeast	
		yeast.	
Unit III	waste water treatment	Primary treatment	
		Secondary treatment	02
		Tertiary treatment.	
Unit IV	Bioremediation	role of plant and microbes and bacteria to decontaminate affected areas	02
	Bioaugmentation	Bioaugmentation, xenobiotics	02
		microbial leaching.	
Unit V			


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Session 2019-20 (Summer Session)

Department Name: Biotechnology
Course Name: B.Sc - 4th sem
Subject:- Microbiology I
Faculty:- Suvandha tehadhe

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Disease transmission	Epidemiology and host parasite relationship	05
		1) Definitions	
		2) Dynamics of disease transmission	
		3) control of communicable disease blocking channels of transmission	
		Protecting the susceptible host	
Unit II	Infections	Infectious microbiology and normal flora	03
		1) microbial mechanism of	

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		Pathogenicity .	
		2) Normal flora of healthy human host .	02
		3) Infectious microbiology .	
Unit III	Study of Pathogens	Study of Pathogenic organism .	
		1) Bacteria .	03
		2) Viruses 3) Protozoa	
Unit IV		Disease control .	
		1) Basic mechanism of action of drug .	
		2) Non-automated and automated drug susceptibility testing .	04
Unit V		3) Various mechanism of development of drug resistance .	

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Session 2019-20(^{winter} Summer Session)

Department Name: Biotechnology

Course Name: BSc 4th Sem

Subject:- Microbiology Paper II

Faculty:- Pooja Phote

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Gene mutation	Concept of gene, muton, cistron, exon, split gene.	06	
		Random vs directed mutation		
		Base pair substitution		
	lac operon	Structural gene, regulatory gene, promoter gene, operator gene, positive and negative	05	
		Intergenic and intragenic suppression, mechanism of spontaneous and induced mutation	03	
	Unit II	Recombination	It is physical breakage exchange and rejoining of two DNA	04

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		molecules or. Homologous or general recombination	
	Transformation Transduction Conjugation	Transformation - uptake of foreign DNA	10
		Transduction - Transfer of DNA through π	
		Conjugation - includes pili and Conjugation tube	
Unit III	Spectroscopy	laws of absorption, Lambert Beer's law, in visible spectroscopy and its application.	03
Unit IV	Chromatography	Paper chromatography Thin layer chromatography Ion exchange chromatography	04
	Centrifugation	gel filtration chromatography types of centrifuge analytical and differential centrifuge	06
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: BSc 6th Sem

Subject:- Microbiology I

Faculty:- Varbhavi Ughade

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Immunity	Definition and general concept	03
		Haematopoiesis and of immune system.	
	Mechanism of non-specific defence.	non specific defence of host	
		Mechanism of non-specific defence.	02
	Functions	Phagocytosis & complement activation, Coagulation system	02
Inflammation, role of toll like receptors.			
Unit II	Antigens	Concept and factors affecting immunogenicity, Antigenic detum-	04

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		determinants, types of antigens	
	Immunoglobulins	Structure, basic unit chemical and biological properties characteristics of domain structure	03
Unit III	Adaptive and Acquired immunity	Adaptive and acquired immunity Cell mediated immune response T Cell biology, cytokines.	04
Unit IV	Antigen-antibody interaction	principle of interaction role of antigen antibody lattice hypothesis, Antibody titer	04
	Hypersensitivity	Definition, anaphylaxis, blood transfusion, arthus reaction.	03
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: BSC 6th sem
Subject:- Microbiology-II
Faculty:- Shubhangi Kushote

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Genetic engineering	Definition and scope of genetic engineering and its experiments	03	
		Tools and techniques	Preparation of samples	03
			enzyme used in DNA manipulation	
	rDNA technology		Introduction of rDNA into host cell PCR and its application, cloning, DNA fingerprinting	04
		Protoplast fusion	protoplast, plant introduction	03
			application of agrobacterium	

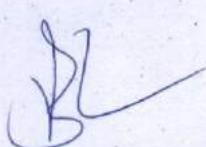
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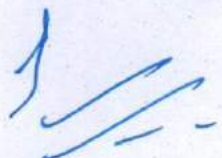


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		Experiences in gene transfer.	
	Products of biopesticides and biofertilizers	Production of biopesticides	
		Prepared fermented foods	05
		Genetically modified foods	
Unit III	Health care biotechnology	Production of hormone, insulin	03
		Production of enzymes	
		Production of vaccine.	
Unit IV	Biosensors and biochips	Biosensors - general concept and application, construction	04
		Biochips - definition example and applications.	
	enzyme technology	Application of enzyme in industry.	02
Unit V			


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Session 2019-20(^{Winter}Summer Session)

Department Name: Biotechnology

Course Name: M.Sc I sem

Subject:- _____
Faculty:- Suvarna Khande

Cell Biology & Enzymology

Lesson Plan format

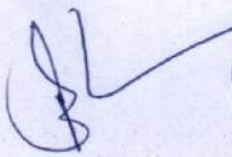
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Plasma membrane	The plasma membrane, also called the cell	3
		membrane, is the membrane found in all cells	
		that separates the interior of cell from outside environment.	
	Cell Walls	provides shape, support and protection	2
		to the cell and its organelles.	
	Mitochondria	known as "powerhouse of the cell". Mitochondria produce the energy necessary for the cells survival and functioning.	2
Mitochondria break down glucose into an energy molecule known as ATP.			
Unit II	Cell Cycle	During G ₁ phase, CDKs are inactive due to low cyclin levels & the presence of CKIs	4

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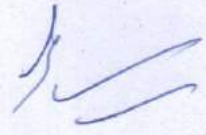


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	Cell signalling	cell signalling is the process by which a cell interacts with itself, other cells & the environment cell signalling is a fundamental property of all cellular life in prokaryotes & eukaryotes. Three components of signaling process signal the receptor and the effector.	4
Unit III	Basic Enzymology	A branch of biochemistry that deals with the properties, activity and significance of enzymes. Enzymes are protein that help speed up chemical reaction in our bodies.	5
Unit IV	Enzyme Engineering	Enzyme engineering is the process of improving the efficiency of an already available enzyme or the formulation of an advanced enzyme activity by altering its amino acid sequence.	3
			2
	Immobilization of enzymes	The term immobilized enzymes refers to enzymes physically confined or localized in a certain defined region of space with retention of their catalytic activities and which can be used repeatedly and continuously.	
Unit V			



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Session 2019-20 (^{Winter} Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. I sem

Subject:-

Faculty:- Vaibhavi Ughade

Molecular Biology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	DNA Replication	In molecular Biology, DNA replication is the biological process of producing two identical replicas of DNA from one original DNA molecule.	2
	Gene Mutations	Mutations an alteration in the nucleic acid sequence of the genome of an organism, virus, or extrachromosomal DNA. ..	2
		Mutations can be many types, such as substitution, deletion, insertion & translocation.	
	DNA repair	DNA repair any of several mechanisms by which a cell membrane maintains the integrity of its genetic code.	3
		At least five major DNA repair pathways Base excision repair (BER), nucleotide excision repair (NER).	
Unit II	Prokaryotic transcription	Prokaryotic transcription is the process in which messenger RNA transcri-	3

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		<p>pts of genetic material in prokaryotes are produced to be translated for the production of proteins.</p>	
	Eukaryotic transcription	<p>Eukaryotic transcription is carried out in the nucleus of the cell and proceeds in three sequential stages initiation, elongation & termination.</p>	3
Unit III	Genetic Code	<p>The genetic code is a set of three letter combinations of nucleotides called codons.</p>	2
Unit IV	Protein Biosynthesis	<p>Protein synthesis is the process in which cells make proteins. It occurs in two stages: transcription and translation.</p>	3
Unit V			

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Session 2019-20(^{Winter}Summer Session)

Department Name: Biotechnology

Course Name: M.Sc I Sem

Subject:-

Faculty:- Pallavi Chaudhary

B Biomolecules

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Chemistry of Carbohydrates	A carbohydrate is a naturally occurring compound or a derivative of such a compound with the general chemical formula $C_x(H_2O)_y$ made of molecules of carbon (C), Hydrogen (H) and oxygen (O)	3	
		Glycolipids	Glycolipids are lipids with a carbohydrate attached by a glycosidic (covalent) bond.	2
			Proteoglycans	A proteoglycan is a macromolecule that has a core protein with one or more glycosaminoglycan chains.
	Proteoglycans are a type of glycoproteins present in the body; especially in connective tissues; bone & cartilage & cell surfaces.			
	Unit II	Chemistry of lipids	Lipids are heterogeneous group of compounds; mainly composed of hydrocarbon chain.	3

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	Lipoproteins	Lipoproteins are round particle made of fat (lipids) and proteins that travel in your body's bloodstream to cells through out your body.	4
Unit III	Proteins	A protein molecule is made from a long chain of these amino acids; each linked to its neighbour through a covalent peptide bond.	4
Unit IV	Nucleic acids	Nucleic acid are biopolymers; macromolecules, essential to all known form of life.	5
	Structure of DNA	DNA is made of two linked strands that wind around each other to resemble a twisted ladder - shape known as double helix.	2
Unit V			

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	GLC	Gas chromatography in which the stationary phase is a liquid.	1
	gel filtration	Gel filtration (GF) chromatography separates proteins solely on the basis of molecular size.	2
Unit III	Electrophoresis	Electrophoresis is a laboratory technique used to separate DNA, RNA or protein molecules based on their size and electrical charge	2
Unit IV	Centrifugation	Centrifugation is a method of separating molecules having different densities by spinning them in solution around on axis at high speed.	3
	Types of centrifuge	There are two types of centrifugal techniques for separating particles differential centrifugation & density gradient centrifugation	2
Unit V			

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Session 2019-20(^{Winter}Summer Session)

Department Name: Biotechnology
Course Name: M.Sc. I sem
Subject:-
Faculty:- Subhangi Vershette

Biophysical Techniques

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Spectrophotometry	spectrophotometry is a method to measure how much a chemical substance absorbs light by measuring the intensity of light as a beam of light Passess through sample solution.	3	
		Fluorescence	Fluorescence is a type of luminescence caused by photons exciting a molecule raising it to an electronic excited state	2
			Mass Spectrometry	Mass Spectrometry is an analytical tool useful for measuring the mass to charge ratio (m/z) of one or more molecules present in a sample.
	Chromatography	chromatography is a process for separating components of a mixture.		2

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: M.Sc. II Sem
Subject:-
Faculty:- Vaibhavi Ughade

Micrabiology

Lesson Plan format

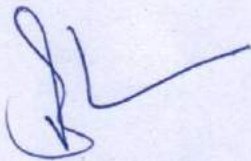
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Algae	Algae are photosynthetic organisms	2
		Algae can be either unicellular or multicellular organisms.	
	Viruses	They are small, have DNA or RNA genomes and are obligate intracellular parasites.	2
		Viruses infect plants (but no other forms of life) and are replicated at the expense of the host cell.	
	Viroids	viroids are infectious agents that consist only of naked RNA without any protective layer such as a protein coat.	2
		Viroids infect plants (but no other forms of life) and are replicated at the expense of the host cell.	
Unit II	Prokaryotes	Prokaryotes are organisms whose cells lack a nucleus and other organelles.	3

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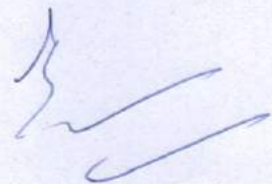


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		Prokaryotes are divided into two distinct groups the bacteria & archaea.	
	Bacterial genetic system	Bacterial genetics is the study of the transfer of genetic information of genetic information in bacteria. Explore bacterial conjugation, transformation & transduction.	2
Unit III	Microbial physiology	Microbial physiology is defined as the study of how microbial cell structures, growth and metabolic function in living organisms.	3
Unit IV	Concept of chemotherapy	Chemotherapy is a drug treatment that uses powerful chemicals to kill fast growing cells in your body. Chemotherapy is most often used to treat cancer.	3
	Drug resistance	Drug resistance occurs when a cell or bacterial becomes less sensitive to specific drug.	2
Unit V			



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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: M.Sc II sem
Subject:-
Faculty:- Suvama telwade

Immunology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Primary Lymphoid organs	These organs include the bone marrow	2
		and the thymus. They create special	
		immune system cells called lymphocytes	
	Secondary Lymphoid organs	These organs include the lymph nodes, the spleen, the tonsils and certain tissue	3
		in various mucous membrane	
		layers in the body (for instance in the bowel).	
Microarrays	A microarray is a laboratory tool	2	
	used to detect the expression of		
	thousands of genes at the same time		
Unit II	Immunoglobulins basic	Immunoglobulins are heterodimeric protein composed of two heavy	2

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	Structure	(H) and light (L) chains.	
	Cell mediated immune responses	cell mediated immunity or cellular immunity is an immune response that does not involve antibodies. Helper T-cells, killer T cells macrophages are the three main kinds of lymphocytes involved in cell mediated immunity.	3
Unit III	Active & Passive immunization	Active Immunisation uses vaccines to induces an immune response in the person receiving the vaccine. Passive immunization is the direct transfer of antibodies to a non-immune person to provide temporary protection.	2
Unit IV	Hypersensitivity	Hypersensitivity reaction are inappropriate immunologic responses occurring in response to an antigen or allergen.	4
	Cancer immunotherapy	Cancer immunotherapy is the stimulation of the immune system to treat cancer.	2
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. - II Sem

Subject: _____

Faculty: Sandip petare

Fundamentals of genetic engineering

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Restriction endonucleases	Restriction endonucleases are enzymes that recognize a specific DNA sequence called a restriction site and cleave the DNA within or adjacent to that site.	2	
		Exonucleases	Exonucleases are nuclease which cut off nucleotides from 5' or 3' ends of DNA molecule.	2
			Topoisomerase	Topoisomerases are nuclear enzymes that play essential roles in DNA replication, transcription chromosome segregation & recombination.
	Construction of genomic			DNA libraries are constructed by partially cutting the genome of interest with a restriction enzyme to generate

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	DNA Library	large fragments, inserting each of the fragments into a vector and then putting each vector into a bacterial cell.	
	DNA Sequencing	DNA sequencing is the process of determining the nucleic acid sequence - the order of nucleotide in DNA. It includes any method or technology that is used to determine the order of four bases - adenine, guanine, cytosine & thymine.	3
Unit III	Boyer Cohen cloning experiment	After preliminary experiments in 1973 the Cohen Boyer team was able to cut open a plasmid loop from one sp. of bacteria insert a gene from different bacterial sp. and close the plasmid.	3
Unit IV	Cloning vector	A cloning vector is a small piece of DNA that can be stably maintained in an organism, and into which a foreign DNA fragments can be inserted for cloning purposes.	3
	Yeast artificial chromosome	Yeast artificial chromosome (YAC) is a human engineered DNA molecule used to clone DNA sequences in yeast cells.	3
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. II Sem

Subject:-

Faculty:- Subhangi Vershette

Applied molecular Biology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Homologous recombination	Homologous recombination is a type of genetic recombination in which nucleotide sequences are exchanged bet ⁿ two similar or identical molecules of DNA.	3	
		Molecular mapping of genome	Molecular mapping aids in identifying the location of particular markers within the genome.	3
			AFLP analysis	Amplified fragment length polymorphism (AFLP) analysis is a universal polymerase chain reaction (PCR) based DNA fingerprinting technique.
	Antisense and			Antisense-oligonucleotides block translation of the mRNA or induce its degradation by RNase H, while

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	Ribozymes technology	Ribozymes and DNA enzymes possess catalytic activity and cleave their target RNA.	
	Epigenetics	Epigenetics is the study of how your behaviours and environment can cause changes that affect the way your genes work.	3
Unit III	Cancer Biology	Cancer is a disease caused when cells divide uncontrollably and spread into surrounding tissues. <small>cancer is caused by changes to DNA.</small>	4
Unit IV	Angiogenesis	Angiogenesis is the formation of new blood vessels. This process involves the migration, growth and differentiation of endothelial cells, which line inside wall of blood vessels.	3
	Metastasis	Metastasis is the movement or spreading of cancer cells from one organ or tissue to another.	3
Unit V			

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Session 2019-20 (Summer Session) ^{winter}

Department Name: Biotechnology
Course Name: M.Sc. (Sem-3)
Subject:-
Faculty:- Pallavi chaudhari

BT and its application

Lesson Plan format

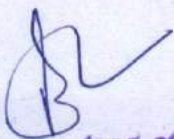
Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Transformation	DNA uptake by bacterial cells.		
		Remove plasmid from bacterial cells, isolate gene of interest, cut open plasmid with restriction enzyme. Invert gene of interest. Recombinant DNA, bacteria reproduce itself	02	
		chemical and physical method, viral vectors, polyethylene glycol, calcium phosphate, core precipitation, dimethyl sulfoxide, liposomes, microinjection, electroporation, somatic cell fusion gene transfer, pronuclear microinjection		
	Transfection	polymerase chain Reaction.		
		Denaturation, Annealing, Extension. Exponential amplification of target DNA with repeated cycling. At different temperature each cycle doubling the amount of DNA in sample sensitivity required for.	03	
		experiment.		
	Amplification of DNA	Basic of tumor formation, hairy rod, feature		
	Unit II	Plant transformation Technology		02

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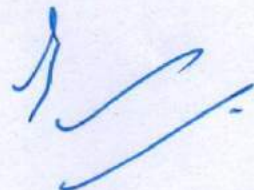


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		of TR and RI plasmid, mechanism of DNA transfer, use of T1 & R vectors use of receptor.	
	Scaffold attachment Region	use of receptor gene, methods of nuclear transformation viral vector	03
		Biophysical & biological transformation method.	
Unit III	Expression of Heterologous gene.	Expression of eukaryotic gene in bacteria, expression of heterologous gene in yeast, insects & mammalian cells	04
Unit IV	Phage display	Production of monoclonal bodies by phage display technique using filamentous phage vectors	02
	Gene therapy	Somatic and germline gene replacement in vivo & ex-vivo gene delivery gene transfer adeno associated virus, herpes virus vectors gene correction replacement, editing regulation & silencing. Gene therapy of human disease.	03
Unit V			



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Session 2019-20 (Summer Session) ^{Winter}

Department Name: Biotechnology
Course Name: M.Sc. (Sem III)
Subject:-
Faculty:- Dandip petare

Plant Biotechnology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Conventional plant breeding	It achieves by crossing together plant with relevant characteristics and selecting the offspring with the	03
		desired combination of characteristics	
	Tissue culture media	Tissue culture media is the source	02
		through which your plant receive nutrients for good and healthy	
		It is combination of different component which provide diff nutrients.	
	Organogenesis & Embryogenesis	The process of formn of organs	03
		from three germ layers It concern	
		cell cell interaction.	
	The process that occur after the fertilization of an ovule to produce.	02	
Unit II	Shoot tip culture	Shoot tip culture isolate from plants	
		can multiply in the form of prothorn like body, axillary bud or shoot	

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		Primordium & regenerate clone plants.	
	Production of haploid plants.	Haploid plants originate from the gametes that do not go through fertilization but can still generate viable individual.	03
Unit III	Application of plant transform ⁿ	To improve the plant yield quality and tolerance to abiotic/biotic stress. to express the different protein like cry toxins, from bacillus, herbicides, mycoprotein, is a form of single cell.	04
Unit IV	Plant metabolic	Plant secondary metabolites, control metabolites & manipulation of phenylpropanoid pathways, alkaloids, Purification Strategies.	02
		Molecular marker aided breeding	03
Unit V		Marker, STS, microsatellites, SSR, AFLP, map based cloning, RFLP maps, linkage analysis, RAPD.	

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Winter
Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: M.Sc (Sem III)

Subject:-

Faculty:- Peepa Thote

Environmental science & Bioresource

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Introduction to environmental science.	Basic principle of ecology and environmental science as well as ethics, geography, anthropology, public policy, political science urban planning, economics, philosophy,	02	
		contamination of air due to presence of substances in the atmosphere that are harmful to health of human and other living.	03	
		Burning fossil fuels, harmful gases, sulphur dioxide, carbon monoxide,		
	Air/water pollution	Soil thermal pollution	Soil erosion is another major factor that causes thermal pollution	03
			As bodies of water are more exposed to sunlight, soil erosion is the gradual wearing away of topsoils from the land. deforestation urban runoff.	
		abiotic & biotic component	Biotic factors are living things within an ecosystem such as plant animals and bacteria while abiotic are.	03

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		non living components	
	Biochemical cycles.	The movement of nutrients and other elements between biotic & abiotic factors, external transfer of elements among different components of forest system.	03
Unit III	Energy & biofuels	Biofuels are liquid fuels produced from renewable biological sources, including plants.	
Unit IV	Biofertilizers	Substance that contains microbes which help in promoting the growth of plants & stress by increasing the application of essential nutrients to the plants.	04
	Bacterial biofertilizers	Biofertilizers are microorganisms that add to the nutrient quality of soil.	02
Unit V		the beneficial microorganisms that help in improving the fertility of soil.	

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Session 2019-20 (Summer Session)

Department Name: Biotechnology
Course Name: M.Sc. (III sem)
Subject: -
Faculty: - Vaibhav Ughade

Dignostic medical Biotechnology

Lesson Plan format			
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Host pathogen Interaction.	Microbes or virus set sustain themselves	02
		ves within host organisms on molecules cellular, organism or populational level, ever emerging and evolving field in discipline of plant pathology.	
		Diagnosis is hypothesis about the nature of patients illness one that derived from observat ⁿ by use of interference.	03
	Bioinformatic tools for molecular diagnosis.	BLAST is tool one of most widely used tools to gain sequence inform ⁿ on finding similarity betw ⁿ DNA & protein sequences against a database is one of the first thing people do when trying to get immediate inform ⁿ about a sequence of intrest.	04
Unit II	Human disease gene	The complete human genome sequ	03
		will facilitate the identification of all	

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		all genes that contribute to disease.	
	Hybridizati ⁿ & ligation based assay	Hybridizati ⁿ based assay contain	03
		the southern blotting, northern blotting	
		PCR, Reverse transcriptase PCR, DNA	
		microarrays	
Unit III	Outline of typical Proteomic Experiment	The proteomic experiment mainly	04
		contain the sample preparation	
		then various technique like 1D/2D	
		electrophoresis,	
Unit IV	Biosensors	Biosensor is device that measure	02
		biological or chemical reactions by	
		generation sensors proportional to	
		concn of analyte in the reaction,	03
	DNA nanosensor	are nanobiosensors mostly recognized	
		and nanoparticles transducing	
Unit V		Component,	

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. (Sem IV)

Subject:-

Faculty:- Shubhangi Virshette

Biostatistics, Bioinformatics Ethics & patenting.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Biostatistics measure of dispersion	It is branch of statistics that	04
		applies statistical methods to wide	
		range of topics in biology, collection and analysis of data.	
	Research design	overall strategy and analytical	03
		approach that you have chose in	
		order to integrate, the different components of the study	
	Phylogenetic clustering	It contain sequence from different	02
patients, which share recent common			
ancestor, These clusters are manifest as groupings in phylogenetic tree.			
Unit II	Bioinformatics	The study of structure behaviour	03
		interactions of natural and engineered computational system.	

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	Bioinformatic tool	It is aid to comparing	04
		analyzing and interpreting	
		genetic and genomic data and	
		more generally understanding molecular biology.	
Unit III	Benefits of Biotechnology	Genetically modified crops, zero	02
		waste bioprocessing, carbon dioxide	
		of raw material and many more.	
Unit IV	Patent & trademark	A patent protects new inventions	04
		processes or scientific creations, trademark protects brands, logos & slogans.	
	IPR	patent, copyright industrial design rights, trademark, geographical indications	04
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
 Course Name: M.Sc (Sem IV)
 Subject:-
 Faculty:- Sandip Petare

Animal Biotechnology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Animal cell culture	Equipment and material in animal cell culture, technology.	
		In vitro maintenance & proliferation of animal cells that will continue to grow outside the living organisms if supplied with appropriate growth rate.	03
		It is gel or liquid that contains	
	culture medium	nutrients and is used to grow bacteria or microorganisms. It should be sterile and isotonic to culturing cells.	02
	characteristics of cells in culture.	cell line characterization involves morphology biochemical and gene based characterization, the species of origin, tissue of origin cell line and nature of cell line have to be identified.	02
The cell culture as to whether cells are obtained directly from animal tissue.			
Unit II	Primary culture	The cell culture system that is	03
		formed by culture cells directly obtained.	

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		from tissue.	
	Established cell line culture.	culture will proliferate identically given appropriate fresh medium	.04
		A cell viability assay measures the number of living cell in sample.	
Unit III	Scaling up of animal cell culture.	Scale up involves the development of culture system in stages from laboratory to industry,	03
Unit IV	Commercial application of cell culture.	Several categories pluripotent stem cell adult stem cell.	03
		model system. toxicity testing, cancer. Research, virology Genetic counselling	
	Three dimensional culture & tissue engineering	Gene therapy.	02
Unit V		3D cell culture is culture environment that allows cell to grow and interact with surrounding extracellular framework assemble functional construct that restore.	04

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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: Msc (Sem IV)

Subject:-

Faculty:- Survana Telrandhe

Applied environmental Biotechnology

Lesson Plan format

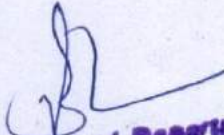
Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Bioremediation	Branch of biotechnology that employ	02
		we of living organism like microbes	
		and bacteria to decontaminated affected areas.	
	Vermi-composting	The process in which earthworm	02
		convert the organic waste into	
		manure rich in high nutritional content.	
Phytoremediation	The treatment of pollutants or	03	
	waste contaminated soil by we of		
	green plants that remove degrade stabilize undesirable substances.		
Unit II	Biomethylation	It is process by which organic	03
		material is microbiologically convert	

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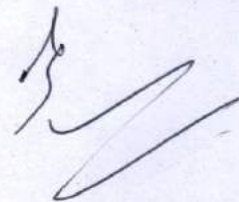


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		under anerobic condition to biogas	
	Bioleaching	The process of extracting metal from ores or waste by using microorganism to oxidize the metal	03
Unit III	Waste water treatment	It is process which removed & eliminates contaminants from wastewaters & covert this into effluent.	04
Unit IV	Xenobiotics	It is chemical to which an organism is exposed that are extrinsic to normal metabolic of that organism.	03
	Pesticides	Pesticides are the substances that are meant to control pests, bactericides, animal repellent, etc.	02
Unit V			


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Session 2019-20(Summer Session)

Department Name: Biotechnology

Course Name: M.Sc. (Sem IV)

Subject:-

Faculty:- Vaibhavi Ughade

Therapeutic medical Biotechnology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required	
Unit I	Gene Therapy	It is technique that modifies a person's gene to treat or cure disease. by replacing disease causing gene.	02	
		Transplantation is surgical procedure.		
		in which organ tissue or group of cell removed from one person to other.	03	
	Tissue & organ transplantation	transgenesis can be important for		
		gene therapy where new gene can be inserted into patients	04	
		to fix genetic disease. genes that are transplanted or moved from one to another organism,		
			02	
	Unit II	Pharmacogenomics	The study of how genes affects a person's response to drugs-person genetic make up.	02
				02

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	Pharmacodynamic	It is the study of drugs molecular biochemical & physiologic effect or actions.	03
Unit III	Nanobio-technology	It is field of science that introduces special physiochemical & biological properties of nanostructures & their application in various areas.	03
Unit IV	Drug discovery	The process of identifying chemical entities that have potential to become therapeutic agents pre-clinical phases, clinical phases & Regulatory approved.	02
Unit V	Clinical trial.	Research studies that test a medical surgical or behavioral intervention in people.	03

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