MAHILA VIKAS SANSTHA,WARDHA

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

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

1.1.1

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

Mahila Vikas Sanstha's
INDRAPRASTHA NEW ARTS COMMERCE & SCIENCE COLLEGE, AT POST NALWADI, DIST. WARDHA (M.S.)
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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
Internal Quality Assurance Cell
Indraprastha New Arts Commerce and Science College, Wardha

Indraprastha New Arts Comm. & Sc. College WARDHA

Principal

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Session 2022-2023 (~~Summer~~ Winter Session)
Department Name: Biotechnology
Course Name: B.Sc 1st sem
Subject:- Biotechnolog-I
Faculty:- Ass. Prof. Aashika Dhage

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	History Perelop mun	History and developmun of	3
		microbiology contribution of	
		Louis Pasteur, Robert Koch.	
	iMicrosco-py	Compound microscopy, Numerical	
		Apertare and its importance	
		resolving power, oil immersion	
	Stain and Staining Procedure	Acidic, Basic and Neutral	
		Stains, Gram staining, Acid	
		fast staining, flagella	
		Staining, Endospore staining	03
Unit II	Bacterid Morpholo-gy	Bacterial morphology and subcellular	
		Morphology of Bacteria	

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		Shape and size generalized slime layer, capsule.	
		Differena between the structure function and the position of the two structure.	
Unit III		A brief idea Bergey's mannual · Morphology of archea archeal cell cell membrane	03
Unit IV		Nutrition : Basic nutritional requirement : Basic idea of such nutrien as water, carbon, nitrogen, sulfur and vitamins etc. natural and synthetic media. nutritional	
~~Unit~~ V		Classification of Bacteria. Selective and Diffrential media, Enriched media, Enrichment media.	

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Session 2022-2023 (~~Summer~~ Winter Session)
Department Name: Biotechnology
Course Name: B.Sc 1st Sem
Subject:- Macromolecule -II
Faculty:- Damini D Dambhare

Lesson Plan format

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

		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 occuring in Proteins, classification of amino acid.	
Unit IV		secondary structure of protein: The α-helix, β-structure (Parallel, antiparallel, mixed β-turn) Tertiary structure Proteins forces that stabilizes	
Unit V		the structure (electrostatics forces, hydrogen and disulfide bond).	

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Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: B.Sc IInd sem
Subject:- Biotechnolg-I
Faculty:- Aashika Bhagat

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I		Microbial Growth.	
		Growth: Growth rate and generation	03
		time, details of growth curve its Phase.	
		Concept of synchronous cultures,	
		continuous and batch cultures.	
		measurement of growth.	
		Physical conditions required	
		for growth, temperature, Ph.	
		etc. maintainance 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	03
		and function of cell, nucleus,	
Unit IV		Golgi complex, endoplasmic	
		reticulum, lysosomes,	
		Pericxisomes.	
Unit V		Plant cell Wall.	
		cytoskeleton (actin) and	02
		cell locomotion.	
		Mitosis and meiosis,	
		muscle and nerve cell structure.	

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

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.	
		triglyceerides, phospholipids	
		Terpenoids and isoprenoids.	
		concept of acid value —	
		Saponification value and	
		iodine value.	
Unit III		Lipids :	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 (~~Summer~~ winter. 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.	Bioenergetiss is the branch of Biochemistry that focuses on how cells transform energy, often by producing storing or consuming (ATP)	2
	Glycolysis	Glycolis is the metabolic pathway that converts Glucose into pyruvate, and in most organisms occurs in the liquid part of cell.	5
	Gluconeogenesis.	Gluconeogenesis is the process that allows the body to form glucose from non-hexose precursors, particularly glycerol, Lactate, pyruvate, propionate, and glucogenic A.A	3.
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 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 III rd
Subject:- Biotechnology Paper II.
Faculty:- Vaishnavi Kakde.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Spectro-photo-metey	concept of electromagnetic Eadiation	
		Specteum of light, absoeption of	3
		electromagnetic Eadiation	
		concept of cheomophoee and	
		aurocheomes, involvement of	4
		oebitals in absoeption of	
		electromagnetic Eadiation, Absoeption.	2
		Specteum and its uses, Beer's law	
		deeivation and deviation extinction	
		coefficient difference between spectrophotometer and calorimeter.	
Unit II	Application of UV.		3

	Spectrofluorometey	Principle, Instrumentation.	
		and application. Absoeption and	3.
		emission flame photometey.	
		Principle, instrumentation & Application.	
Unit III	Chromatography	Paetition principle, paetition	
		coefficent, nature of paetition	3.
		forces; brief account of Paper chromato.	
Unit IV	Ion-exchange chromatography	Paetition principle, paetition.	
		coefficient, nature of paetition.	
		forces. Type of resins; choice.	3
		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	Immuno-logy.	Immune system, Organs and	
		cells of immune system.	3
		immunity · innate immune mechanism.	
	Aquired immune. mechanism	It is also called specific immunity because it tailors.	4
		its attach to a specific	
		antigen previously encountered.	
	Complement. system.	The complement system is part of	
		four body's immune system that cleans up damaged cell	3
		helps your body heal after.	
		an injuri or an infection. and destroys	
Unit II	Antibody structure.	The antibody has a Y-shaped	2.
		structure, made up of four	

		Polypeptide subunit. each subunit	
		has two identical light & heavy chains.	
	Antibody classes:	five Types of antibodies each.	4
		with a different function.	
		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	4
		physiological condition in which.	
Unit IV	vaccination	vaccination is a simple safe and	
		effective way of protecting.	3
		People against harmful diseases.	
		before they come into contact with them.	
	Immunological Technique.	Antigen Antibody reaction,	
		Precipitation, agglutination,	2.
Unit V		complement fixation immunodiffusion.	
		ELISA.	

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Session 2022-2023 (Summer Session)
Department Name: Biotechnology.
Course Name: BSC ~~VI~~ 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 refers to the movement of ions due to an externally applied electrostatic field.	4
	paper electrophoresis	The technique of paper chromatography is simple and inexpensive and requires only micro quantities.	3
	Gel electrophoresis	Gel electrophoresis is a technique used to separate DNA fragment based on their size and charge. electrophoresis involves running a current through a gel.	3
Unit II	SDS - PAGE.	Sodium Dodecyl Sulphate Polyacrylamide gel electrophoresis	2

		is a technique used for the	
		sepration of proteins based.	
	Isoelctric focussing	Also known as electrofocu-	
		ssing is a technique for	
		sepaeating different molecules	
		by differencer in their (PI)	
Unit III	Isotopic Teacer Taquanic:	Radioactive & stable isotopes	
		Eate of eadioactive decay,	
		units of eadioactivity.	
Unit IV		measeement of eadioactivity	
		falling deop method for	
		deuterium measurement	
		mass spectrometey	
	centrifu-gation.	liquid scintillation counters,	
		analytical centrifugation, Sedimen-tation 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. Petaee sir.

Lesson Plan format

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

		Gene mutations: Missense -	
		Nonsense and Feamskiff mutations.	3.
	Mutations & DNA Repair.	Mutagens: physical and	
		chemical Mutagens.	4
		Repair: Mismatch Repair.	
		NER, BER, light induced Repair	
Unit III	Transcription.	Enzymatic synthesis of RNA:	
		Basic features of transcription	
		structure of Prokaryotic RNA polymerase.	4
Unit IV		Enzyme and Holoenzyme	
		significance of σ factor), concept	
		of Promoter (Pribnow box, -10 and	3
		-35 sequences and their significance.	
		four steps of transcription	
		Promotor binding and activator	4
Unit V		RNA chain initiation and	
		Promoter escape, chain	
		elongation, Termination and	5
		Release. Detail account of.	
		Initiation, elongation, termination.	

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Session 2022-2023 (Summer Session)
Department Name: Biotechnology
Course Name: B.Sc sem V
Subject:- Biotechnology Paper III
Faculty:- Sandip. patee.

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
	decoding system.	universality, degeneracy and commaless nature of codons. The decoding system: amino	3
		synthetases, brief structure of t-RNA, the adaptor Hypothesis attachment of amino acid. to t-RNA.	4
		codon anticodon interaction. Wobble Hypothesis	
Unit II		Selection of initiation codon shine and Dalgarno sequence.	4

		Initiation, elongation &	4
		termination. Regulation of	
	Protein synthesis	translation: Autogenous con-	
		trol of r-protein, phage	5
		T4 protein p32 translation-	
		al regulation antibiotic Translation.	
Unit III	r-DNA Technology	DNA cloning: Basics of genetic	3.
		engineering, restriction endo-	
		nucleases, other enzymes of	
Unit IV	Vector.	DNA manipulation. Sete	
		plasmid vector (pBR322 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 there 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	Environmental Biotechnology.	water and waste water treatment process, current community drinking water treatment process disinfection of water (chlorination and ozonation) secondary and advanced treatment of sewage (domestic waste water).	3 + 2
	Biodegradation.	definition and concept of. Biodegradation, biodegradation and Biotransformation. and current community drinking water.	4.
Unit II	Xenobiotic	Xenobiotic is an term used to describe chemical substances that	

		Xenobiotic and Recalcitrant.	
		compounds. Bioaccumulation.	
	waste-water quality.	concept of COD - chemical	
		oxygen demand, DO. Dissolved	3
		oxygen and BOD - Biological	
		oxygen demand.	
Unit III	Food Biotechnology.	Food Biotechnology production.	3
		and types of cheese,	
		microorganism as food -	
Unit IV		Production of mushroom and.	
		Spirulina, assessment of	3
		microbiological quality of.	
		various foods. Industrial	
		awareness, Quality control	4
		and quality assurance in food	
Unit V		and Pharmaceutical industry	
		concept of current good	3
		manufacturing practices in industry	

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

Lesson Plan format

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

		Tissue and micropropagation.	
		suspension culture, callus formation.	
	Teamsgenic plant	cloning in plants Ti-plasmid	
		concept of teamsgenic 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 (~~Summer~~ Winter 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	
	Contributions of scientists	Van Leeuwenhoek, Louis Pasteur,	
		Robert Koch, Joseph lister,	
		Winogradsky, Beijerinck, John Tyndall, Thomas M. Rivers.	3
		4) Branches of Microbiology — Definition and scope of a)	
	Medical Microbiology	Systemic microbiology -	
		Bacteriology, mycology, ~~Py~~	
		Phycology, Virology. b) Biotechnology	4
		c) Cyeo microbiology (d) exobiology (e) medical microbiology	
		f) Environmental microbiology	
		g) Industrial and food microbiology.	
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 inclusion	4
		5) capsule, slime layer, Pilli.	
		6) Endospore structure.	
		7) Exospores, myxospores.	
		8) significance of dormancy.	
Unit III	Nutritional types of bacteria	8 Microbial nutrition.	
		1) Nutritional types of Bacteria	3
		2) Basic Nutritional requirement	
		3) Types of culture media – selective, Differential, Enriched	
Unit IV	media for Fungi isolation.	Synthetic & non-synthetic	
		4) media for isolation of fungi; Definition, ingredients,	2
		Principles and applications.	
		5) Enriched culture.	
		Microbial growth.	
		1) Bacterial Reproduction.	
Unit IV	Bacterial Reproduction.	2) Axenic cultures	4
		3) growth curve.	
		4) Mathematical ~~yes~~ 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 (~~Summer~~ winter Session)
Department Name: Biotechnology
Course Name: BSc 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 Salvino D'Armate is credited with inventing the first wearable eye glasses in 1284 Hans and Zacharias Janssen (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 specimens.	03
Unit II	Types of Stain	Acidic or anionic dye Basic or cationic dye - Neutral dye	02

		Dyes with Azine group Dyes with Azo group. Dyes with Indamine group	02
	Simple and differential Staining	Simple staining - In this only one stain is used for staining of bacteria Differential staining - It involves the use of series of dyes and sometimes additional chemical is used.	03
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.	
		4) Archae bacteria : Types of	
	Archae Bacteria	archae bacteria (Brief	2
		description) methanogenic	
		bacteria and their importance.	
Unit II	Eukaryotic Microbes	Eukaryotic Microbes.	3
		1) Fungi & Yeast : General characters	

		Asexual and sexual mode of reproduction	2
	Algae // Protozoans	2) Algae :- General characters and industrially important agal cells.	
		3) Protozoans :- General charac	3
Unit III	Viruses	Acellular microbes / viruses.	
		1) Discovery of viruses, general structure, symmetry and classification.	
Unit IV		2) Cultivation, chick embryo.	2
		3) Detection of viral growth	
		4) T_4 - Bacteriophages.	
		5) Lambda phage.	
Unit IV	Rhizobium Introduction	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: Bioternnology
Course Name: BSc sem II
Subject:- Microbiology -II
Faculty:- Vaishnavi Kakde

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: BSc 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,	2
		glycogen, cellulose,	
		osazone formation.	
	classification of lipids.	3) classification of lipids,	3
		structure of ~~triglycerides~~,	
		compound lipids, derived lipids.	
Unit II	Amino acids	Amino acid ~~pro~~ and protein	2
		1) classification of amino acids	

	titration curve.	2) Titration curve, acidic, basic and neutral amino acids.	2
	Proteins structure	3) Peptide bond theory.	3
		4) organizational levels of proteins. 5) oligomeric Protein	
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
		4) Enzyme regulation and types.	
		5) Enzyme Inbition & types	
		6) concepts of enzymes.	
		7) membrane bound enzyme	
Unit V	Nucleic acid	Nucleic acid and vitamins.	
		1) structure of Purines & Pyrimidine 2) structure of DNA, RNA.	4
		3) types of vitamins.	
		4) Hypervitaminosis – causes, Symptoms and Vit. A, & 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,	
		continious 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 screenig is designed to isolate potentially	
		intresting 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	
	Harvesting of biomass	carbon & nitrogen to support.	
		Biomass is known of 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	
Unit IV	Citric acid	that atm. pressure.	
		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	
Unit V		protein whose origin is	
		bacteria, yeasts, molds or	
		algae.	

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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 carbohydrate	metabolism.	2
		1) carbohydrates. 1) General strategy of metabolism	
		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 omegaoxidation	

		2) Replication of DNA, modes of replication, general	2
	Rolling circle model	features, enzymes involved	
		rolling circle model and	2
		knife fork model,	
		3) Prokaryotic transcription	
Unit III	Introduction of Amino acids	Amino acids and proteins	2
		1) Amino acid breakdown,	
		2) metabolic breakdown	
Unit IV		3) glycogenic and ketogenic	
		amino acids.	
		4) genetic code 5) Prokaryotic translation	3
		Energy generation.	
		1) High energy molecules.	
Unit IV	Substrate level phosphorylation	2) substrat 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 Nagpale

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 ~~drink~~ 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 aeromicrobiology.	2
Unit IV	Bioremediation	Bioremediation is a biological process that uses living organisms, usually microorganisms (bacteria & fungi) & plants, to degrade, remove alter, 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 Waghade 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
		1) Definitions, signs, symptoms, syndrom, stages of infection	
	Various diseases.	Acute infection, atypical infection latent infection.	
		2) Dynamics of disease transmission	4
		causative or ecological agents sources of reservoirs.	
	Disease control.	Exogenous, Endogenous infection.	
		3) control of communicable diseases.	
		control of sources, blocking channels of transmission	3
		Protecting of susceptible host.	
Unit II	Infections	Infectious microbiology and	2
		normal flora.	

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

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Winter
Session 2022-2023 (~~Summer~~ Session)
Department Name: Biotechnology
Course Name: BSc. Sem V
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 results 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	Electro-phoresis	Electrophoresis is a laboratory technique used to separate DNA, RNA or protein molecules based on their size & electrical charge.	2
Unit IV	Chromato-graphy	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 denfenses of host.	
		4) Mechanism of non-specific defense	4
		A) First line of defense.	
		b) second line of defense	
		c) cellular components.	
		5) 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.	c) 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	
Unit IV		deletion.	
		3) clonal selection and	2
		clonal deletion.	
		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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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.	
		4) Expression of cloned genes.	
	Gene Library	construction of gene library, cells for cloning, expression of Prokaryotic genes.	2
		5) PCR & its application, DNA fringerprints,	
Unit II	Hormones	Health care biotechnology.	2
		1) Production of hormones.	

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

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Session 2022-2023 (~~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 an alteration in the nucleic acid sequence of the genome of an organisms, virus or extrachromosal DNA. Mutations can be many types such as Substitution, deletion, insertion & translocation.	2
	DNA Repair	DNA repair any of 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	3
		the nucleus of the cell and proceeds in	
		three sequential stages.	
		Initiation, elongation & termination.	
Unit III	Genetic code	The genetic code is a set of three letter	2
		combinations of nucleotides called	
		codons.	
Unit IV	Protein Biosynthesis	Protein synthesis is the process in which	3
		cells make proteins. It occurs in two	
		stages: transcription and translation.	
		There are three stages of protein	
		Biosynthesis Initiation, elongation	
		and termination.	
~~Unit V~~	Regulation of expression in prokaryotes	The regulation of gene expression in	2
		prokaryotic cells occur at the transcri-	
		ptional level.	

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

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
	Cell Walls	Provides shapes, support and protection to the cell and its organelles.	2
	Mitochondria	known as "powerhouse of the cell" mitochondria produce the energy neccessary for the cells survival and functioning. mitochondria break down glucose into an energy molecule known as ATP.	2
Unit II	Cell cycle	During G1 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 Kakde

Biomolecules

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Chemistry of Carbohydrates	A carbohydrate is a naturally occuring 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 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 throught 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 from 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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Session 2022-2023 (~~Summer~~ Winter Session)

Department Name: Biotechnology

Course Name: M.Sc. I Sem

Subject:-

Faculty:- Anjali 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 by measuring the intensity of light as a beam of light passes through sample solution.	2
	fluorescence spectrophotometry	Fluorescence is a type of luminescence caused by photons exiciting a molecule, raising it to an electronic excited State.	3
	Mass spectrophotometry.	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:- Damini Dambhare

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

		Prokaryotes 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 treatement 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:- Rakshanda dagvale

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 reaction are inappropriate immunologic responses occuring 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 Patole

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
	Topoisomerases.	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 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 chang 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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Department Name: Biotechnology
Course Name: M.Sc. (Sem III)
Subject:- Diagnostic medical Biotechnology
Faculty:- Vaibhavi Waghede

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. ever emerging and evolving field in discipline of plant pathology	02
	Disease diagnosis of disease	diagnosis is hypothesis about the nature of patien illness one that derived from Observation by use of interference. taking medical history, performing	02
	Bioinformatics tool for molecular diagnosis.	physical exam, obtaining diagnostic tests. BLAST is tool one of most widely used tools to gain sequence information finding similarity betwn DNA & protein sequence against database is one of first thing people do when trysing to get immediate about a	03
Unit II	Human disease gene.	Sequence of interest.	02
		The complete human genome sequence	

	polymorphism	It is popular concept in programming	
		reffering 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.	
	nanodignostics	It involve the use of nanotech-	
		nology in biomedical dignostics	
Unit V		microchips, biosensors, nanorobots.	
		use in this nanodignostics.	

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

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.	
	Transfection	Recombinant DNA, bacteria produce itself.	03
		chemical & physical methods, viral vector, polyethylene glycol, calcium	
		phosphate, (co precipitation, dimethyl) Sulfoxide, liposomes, microinjection	
	Application of DNA	electroporation, Somatic cell fusion,	
		gene transfer, pronuclear microinjection	02
		polymerase chain reaction, Denaturation annealing, extension.	
		DNA with repeated cycling at different temperature.	
Unit II	plant transformation technology	Basic of tumor formation hairy	02
		root feature of Ti & Ri plasmid.	

	Scaffold attachment Region.	use of raeptor gene, methods of	03
		nuclear transformtion, viral vectors	
		Biophysical and biological	
		transformation method.	
Unit III	Expression of heterologous gene	Expression of eukaryotic gene in	02
		bacteria. expression of heterologous	
		gene in yeast, insect & mamalian cells.	
Unit IV	phage display	Production of monoclonal bodies	03
		by phase display technique	
		using filamentous phage	
		vectors.	
	Gene therapy	Somatic cell germline, gene	02
		replacement in vivo & ex vivo	
Unit V		gene transfer, adeno-associat-	
		ed virus herpese virus vectors	
		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 acheive by crossing together	02
		plant with relevant charcteristics and	
		Selecting the offspring with desired combination of	
	Tissue culture medium	charcteristics.	
		Tissue culture media is the sourp through which your	03
		plant receive nutrients for good and healthy growth. It is combina-	
	Organogenesis & embryogenesis	tion of different components which provides diff. nutrients.	
		The process of formation of organs	04
		from three germ layer. It concern cell-cell interaction	
		fertilization of an ovule to produce fully developed plant embryo	02
Unit II	Shoot tip culture.	Shoot tip culture isolate from	
		plant can multiply in the form of	

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

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Session 2022-2023 (~~Summer~~ Winter Session)

Department Name: Biotechnology

Course Name: M.Sc. (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 heath of human & other living burning fosil fuels, harmful gases Sulphur dioxide carbon	03
	Soil thermal pollution	monooxide. Soil erosion is another major factor that causes thermal. As bodies of water are more exposed to sunlight soil erosion is the gradual wearing away of top soils from the land deforsta-	02
Unit II	abiotic & biotic	tion, urban runoff. Biotic factors are living thing within	01

		on 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	Biofertilizers	Substance that contains microbes which help in promoting the growth of plants & stress by increasing the supply of essential nutrients to the plants	03
Unit IV	Bioremediation	Substance that contains microbes which helps in promoting the growth of plants & stress by increasing the supply of essential nutrients of the plants.	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	
		In vitro maintenance & proliferation of animal cells that will continue to grow outside the living organisms is supplied with appropriate	04
	Culture medium	growth condition, to grow outside the ~~living~~ nutrients & used to grow bacteria or m.o. It should be Sterile and isotonic to culturing	02
		cells physiological pH and osmolarity required to maintain animal culture medium.	
	Characteristics of cell in culture.	cell line characterization involves morphological, biochemical and gene based characterization the species of origin, tissue of origin cell line	03
		and nature of cell line have to be identified.	
		The cell culture is to wheather cells are obtained diredly from animal tissue.	02
Unit II	Primary culture.	The cell culture System is formed by culture cells diredly obtained.	

	Established cell line culture.	from tissue.	
		culture will proliferate indenitely 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	02
		of culture systems in stages from	
		labortory to industry	
	Stem cell culture.	Stem cell have remarkable potential to renew themselves. There are	02
Unit IV	Commercial application of cell culture.	Several categories pluripotent stem cell, adult stem cell.	
		model systems, toxicity testing, cancer	
		Research, virology, Genetic counselling Gene therapy.	03
	Three dimensional	3D cell culture is culture enviroment	
		that allows cells to grow and interact with surrounding extracellular framework.	
Unit V	cultures of tissue engineering.	assemble functional constructs that restore, maintain or improve	02
		damaged tissue or whole organs.	

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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 collection and analysis of data.	02
	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 ancestors These clusters are manifest as grouping in phylogenetic tree in which phylogenetic clustering is the study	02
Unit II	Bioinformatics.	of structure behaviour interaction of natural and engineered computational system.	04

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

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Bioremediation	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 greenhouse plants that remove degrade stabilize undesirable substances.	03
Unit II	Biomethylation.	It is process by which Organic material is microbiologically convert,	02

		under aerobic condition to	
		biogas.	04
	Bioleaching	The process of extracting metal	
		from ores or waste by using	
		microorganism to oxidize the	02
		metals.	
Unit III	Waste water treatment	It is process which removes &	
		eliminates contaminants from	
		wastewater & convert this into effluent	03
Unit IV	Xenobiotic	It is chemical to which an	
		organism is exposed that are	
		extrinsic to normal metabolism	02
		of that organism.	
	Pesticides	This are the substances that are	01
		meant to control pests, bactericides	
Unit V		animal, repellent, etc.	

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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
	tissue & organ transplantation.	Transplantation is surgical procedure in which organ tissue or group of cell removed from one person to other.	02
	Transgenic & their use.	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 02
Unit II	Pharmacogenomics	The study of how genes affects a person's response to drugs person,	

		genetic make up.	
	pharmaco-dynamics	It is the study of drug's	02
		molecular biochemical & physiologic	
		effects or actions.	
Unit III	Nanobio-technology	field of science that introduce	01
		Speical physiochemical & biological	
		Properties & nanostructures & their	
Unit IV	Drug discovery	application in various areas.	
		The process of identifying chemicals	02
		entities that have potential to	
		become therapeutic agents, pre clinical	
	clinical trial.	phase & Regulatory approch.	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 I st 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 small to be see naked eye it was obvious that their discover	03
	Theory of Biogenesis and abiogenesis	Theory of abiogenesis or spontaneous generation. Acc. to their to this theory it is belived that life	02
	John Tyndall	In 1876 John Tyandall an english physicist supported the pasture view that dust Pasture carry the microorganism	03
Unit II	Bacteria	The bacterial cell-the evolutionary history of prokaryotic cell extend back 3.5 billion year	03

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	Various shapes and arrangements found in Bacteria	Bacteria come in variety of shape and arrangement. These characteristics are particularly.	2
Unit III	Bergi's manual	It is generally recognized that ultimate aim of any taxonomy of any group of organisms	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 Acid	Chemical structure and base composition of nucleic acid, chargaff's rules	3
		Watson Crick model (B-DNA), deviations from Watson-Crick model other forms of DNA (A and Z-DNA)	02
		forces stabillizing nucleic acid structure. Maxam and Gilbert DNA squencing. structure of t-RNA	03
Unit II	chromosomes	Concept of prokayotic gene and eukayotic gene. Defination 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 occuring 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 Chaudhare

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. To convert this to Growth rate simply divide 0.301 by the Generation time	2
	Growth rate and various phase	Growth rate are computed by dividing the value and differance between the ending and starting values	3
	Phisical condition required for growth	Temprature of Bacteria can live in hotter and colder tempratures than humans, but they do best in warm moist, protein-rich environment that is pH.	2
Unit II	Microbial Control	Control of microbial growth means to inhibit or prevent growth of	

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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 mitochandria	3
Unit III	Eukayotic cell	Eukayotic cells have a nucleus enclosed within the nuclear membran and form large and complex organism.	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 germ cells and apicomplexans.	3
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: B.Sc II sem
Subject:- Biotechnology Paper I
Faculty:- Pallavi Chadbudi

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Carbohydrate 1) classification 2) Nomenclature	Carbohydrate also called are type of macronutrients found in certain food and drink	2
		Carbohydrate are divide into four types: Monosaccharide, diasaccharide and Polysaccharide	3
		Carbohydes can be divide into two main tes simplex and complex.	3
Unit II	Lipid of Type of Lipid	Type of Lipid structure of saturated and unsaturated	2

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		unsaturated, fatty acid	
		triglyceride, phospholipid	
		plasmogen, gaglioside and	3
		spingolipids., Terpenoids and	
		Isoprenoids- defination and	
		representative.	
Unit III	Enzyme	Terminology: Active site.	
		allosteric site Haloenzym,	4
		apo-enzym, coenzym, substrat	
Unit IV	Assay of enzym	concept of activity, specific	
		activity, tuenor or number.	3
		units of enzym activity	
		spectrophotometric method,	
		Enzyme kinetic- Michell -	
		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	spectro-photo-metey.	concept of electromagnetic Eadiation spectrum of light.	3.
		Absoeption of.	
		electromagnetic Eadiation.	
	concept of cheomo-phores	Auxotheomos, involvement	
		of oebitals in abroeption.	4
		of electromagnetic Eadiation.	
	Abroe-ption spectem.	Its uses, Beer's law	
		deeivation and deviation,	2
		extination coefficient. Differe	
		between spectrophotometer and coloeimeter.	
Unit II	Applicat of U.V	U.V Eadiation is widely	3.
		used in industrial proceress	
		and in medical and	
		dental Peactices.	

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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	chromatography	Chemical analysis, chromatography is a laboratory technique for the separation of a mixture	3
Unit IV	Gel filteration	Gel-filteration is also known as size exclusion chromatography molecular sieve chromatography.	4
	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 immolilized	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 Papee II.
Faculty:- Pooja thote.

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Migeation of ions in electric field	factors affecting electrophoeetic	03
		mobility. the movement of ions	
		due to an exteemally applied	
	papee electrophoresis.	papee electrophoeesis employs.	02
		filtee papee strips soaked.	
		in buffee solution, usually.	
	Gel electrophoresis	DNA electrophoresis is a standard laboeatoey technique used to	04
		identify, quntify, and pueify DNA.	
		feagments, DNA electrophoresis	
		involves loading DNA samples into the wells.	05
Unit II	SDS PAGE.	sodium dodecyl-sulfate polyac-	
		eylamid gel electrophoresis (SDS-Page)	

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	Isoelectric focussing	It is an electrophoretic tech for the seperation of amphoteric	03
	Pulsed field gel electrophoresis	analytes according to their isoelectric point (Pi) by the application of an electric field along a pH gradient formed in a capillary.	03
Unit III	Isotopic tracer	Isotopic tracer any radio-active atom detable in a material in a chemical	04
Unit IV	measurement of stable isotopes.	Biological stable isotopes ratios are measured using mass spectrometry, which seperates the different isotopes of an element on the basis.	02
	centrifugation	centrifugation is a method of seprating molecules having different densities by spining.	03
Unit V	Analytical centrifugation.	Analytical Ultracentrifugation is an analytical technique which combines an ultracentrifuge with optical monitoring.	02
	Biostatistics.	Biostatics is a branch of statistis that applies statistical method.	04

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NACSC

Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: BSc IV sem
Subject:- Biotechnology paper I.
Faculty:- Shubhangi Vieshette.

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 defects the body	04
	Innet immune mechanism	In innete 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	03
		response that does not	
		involve antibodies. cell mediated	
Unit III	Hypersensitivity.	Exaggerated or inappropriate	03
		immunologic responses occuring	
		in response to an antigen or	
Unit IV	Vaccination	Vaccines reduce risks of	
		getting a disease by working	04
		with your body's natural	
		defences to build protection.	
	immunological tech	Immunological techniques include	05
		both experimental methods to study.	
~~Unit V~~	Hybridoma Technology	Hybridoma is a culture of	05
		Hybrid cells that results from	
		the fusion of B cells and myeloma.	
	ELISA.	The enzyme linked immuno-	04
		sorbent assay is a commonly used.	

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NACSC

Session 2019-20(Summer Session) winter

Department Name: Biotechnology
Course Name: B.Sc. IST sem.
Subject:- Microbiology I.
Faculty:- Suvarna telrandhe

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	Robert koch, Joseph Lister, winogradsky, Beijerinck, John T.	04
		Thomas, M. Rivers.	
		4) Branches of microbiology - Definition and scope of a) Systemic	
	Branches of microbiology	microbiology bacteriology. c) Geo microbiology d) Exobiology.	03
		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.	04
		2. description of size, shapes.	

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		3) Typical Bacterial cell culture	
		4) Ribosomes, Nucleoid, Plasmid 5) capsules, Slime layer, Pili.	03
	Formation of Spores	6) Endospores, mytospores. 7) Exospore 8) Dormancy.	
		1) Nutritional types of Bacteria. 2) Basic nutritional Requirement	
		3) Types of media 4) media for Isol 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
		principle 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, auxophore	

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

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: Bsc 2nd sem
Subject:- Microbiology I
Faculty:- Vaibhavi Ugindde

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Proteobacteria	Proteobacteria is a major phylum of gram-ve bacterium including pseudomonata.	06
	Actinomycetes and Archea bacteria	Characteristics of Streptomyces and their application types of archea bacteria	05
	Cyanobacteria	cyanobacteria commonly known as blue green algae. gram-ve, prokaryotes perform oxygenic photosynthesis	04
Unit II	Eukaryotic microbes	Fungi and yeast - general characters, asexual and	03

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		Sexual mode of reproduction	
	Algae and protozoa	General characters and industrial important algal oils.	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, syntropism, metabolism, parasitism, antagonism, competition	04
	Protist – protist – plant animal	Protist - protist interaction. Protist - plant interaction Protist - animal interaction.	05
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: BSc IInd sem
Subject:- Microbiology-II
Faculty:- Shubhangi Inchekar

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

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		By high temperature	
	preservation by Chemical preservatives	Acetates, Citric acid, lactic acid, propionates, benzoates nitrates, salt and sugar.	03
Unit III	milk microbiology	Composition of milk Sources of microorganisms in milk MBRT	02
Unit IV	food poisoning	Food intoxication and food infection, clostridium, Staphylococcal enterotoxin poisoning.	
	objectives of FSSAI	Intro to FDA, BIS, FSSAI objectives and responsibilities.	04
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: BSc IIIrd sem
Subject:- Microbiology paper I
Faculty:- Suvarna Tekrandhe

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 pkya	
	Amino acid classification	Aromatic amino acids	03
		Basic amino acids	
		Glycine, phenylalanine, tyrosine	
		and tryptophan.	
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
	vitamines	Hypovitamosis and hypervitamosis classification of vitamines.	03
Unit V			

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Session 2019-20(~~Summer~~ winter Session)

Department Name: Biotechnology
Course Name: BSc III rd sem
Subject:- Microbiology II
Faculty:- Pooja thote

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Fermentor	Types of fermentors, parts of fermentor, fermentation process	04
	Types of fermentation process	lactic acid fermentation. Yeast strains and bacterial convert starch or sugar into L.A	03
	History and scope of Industrial microbiology	Pasteurization method Scope - creation of industrial products cheese, yogurt sep	04
Unit II	upstream process	Comprises tasks in the initial stages of fermentation process	03

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		in biotechnology. This include 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: Biotechnology
Course Name: BSc 4th Sem
Subject:- Microbiology -I
Faculty:- Vaibhavi Vighade

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	
		TCA pathway and its	03
		regulation	
	pentose phosphate pathway	multienzyme pathway that	
		shares a common starting	03
		molecules with glucose	
		and glucose-6-phosphate.	
Unit II	lipids	Betaoxidation and omegaoxidation	04
		Replication of DNA, modes	

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		modes of replication	
	Nucleic acid	Rolling cycle, Knife fork model prokaryotic transcription including general features on 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.	Oxidative phosphorylation and ATP generation.	03
Unit V			

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Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: BSc 4th sem
Subject:- Microbiology paper II
Faculty:- Shubhangi Mushate

Lesson Plan format

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

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		and Anderson technique.	
	Agricultural microbiology	Symbiotic, Nitrogen fixing bacteria, mechanism of Nitrogenase enzyme formation of root nodules.	04
Unit III	waste water treatment	Primary treatment Secondary treatment Tertiary treatment.	02
Unit IV	Bioremediation	role of plant and microbes and bacteria to decontaminate affected areas	02
	Biomagnification	Bioaugmentation, xenobiotics microbial leaching.	02
Unit V			

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Session 2019-20(Summer Session) Winter

Department Name: Biotechnology
Course Name: B.Sc - VI th sem
Subject:- Microbiology I.
Faculty:- Suvarna Tekwadkar

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

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		Pathogenecity.	
		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	04
		automated drug susceptibility testing.	
		3) Various mechanism of	
Unit V		development of drug resistance.	

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Session 2019-20(Summer Session) Winter

Department Name: Biotechnology
Course Name: BSc V th Sem
Subject:- Microbiology Paper II
Faculty:- Pooja Thote

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Gene mutation	Concept of gene, muton, cistron recon, split gene.	06
		Random vs directed mutation	
		Base pair substitution.	
	Lac operon	Structural gene, regulatory gene, promoter gene, operator gene, positive and negative	05
	Genetic Suppression	Intragenic and intergenic 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 e. Homologous or general recombination	
	Transformation Reproduction conjugation	Transformation - Uptake of foreign DNA.	10.
		Reproduction - Transfer of DNA through T4	
		Conjugation - Includes pili and Conjugation tube	
Unit III	Spectroscopy	Laws of absorption, Lambert Beer's law, UV visible spectroscopy and its applications.	03
Unit IV	Chromatography	Paper chromatography	
		Thin layer chromatography	04
		Ion exchange chromatography	
		Gel filtration chromatography	
	Centrifugation	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:- Vaibhavi Ughade

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Immunity	Definition and general concept Haematopoiesis case of immune system.	03
	Mechanism of non specific defence.	Non specific defence of host mechanism of non-specific defence.	02
	functions	Phagocytosis, complement activation, Coagulation system inflammation, role of toll like receptors.	02
Unit II	Antigens	Concept and factors effecting immunogenicity, Antigenic determ-	04

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		determinants, types of antigens	
	Immuno-globulins	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 & cell biology, cytokines.	04
Unit IV	Antigen-antibody interaction	principle of interaction role of antigen antibody lattice hypothesis, Antibody titre	04
	Hypersensitivity	Definition, anaphylaxis, blood transfusion, authus 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 Kushalle

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 enzyme used in DNA manipulation	03
	rDNA technology	Introduction of rDNA into host cells PCR and its application, cloning, DNA fingerprinting	04
Unit II	Protoplast fusion.	Protists, plant interaction application of agrobacterium	03

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		Aumefaciences in gene transfer.	
	production of biopesticide and biofertilizer	Production of biopesticides Fermented foods Genetically modified foods	05
Unit III	Health care biotechnology	Production of hormone, insulin production of interferon production of vaccine.	03
Unit IV	Biosensors and biochips	Biosensors - General Concept and application, Construction, Biochips - definition example and applications.	04
	enzyme technology	Application of enzyme in industry.	02
Unit V			

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Session 2019-20 (~~Summer~~ Winter Session)

Department Name: Biotechnology
Course Name: M.Sc. I Sem
Subject:- Cell Biology & Enzymology
Faculty:- Suvarna Telrande

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
	Cell Walls	Provides Shape, support and protection to the cell and its organelles.	2
	Mitochondria	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 G1 phase; CDKs are inactive due to low cyclin levels & the presence of CKIs	4

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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 signalling 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
	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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Session 2019-20(~~Summer~~ Winter 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. Mutations can be many types, such as substitution, deletion, insertion & translocation.	2
	DNA repair	DNA repair any of several mechanisms by which a cell ~~membrane~~ 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 transcri-	3

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		Pts of genetic 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 Initiation, elongation & termination.	3
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
Unit V			

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Session 2019-20(Winter Session)

Department Name: Biotechnology
Course Name: M.Sc I sem
Subject:- B Biomolecules
Faculty:- Pallavi Chaudhary

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Chemistry of Carbohydrates	A carbohydrate is a naturally occuring 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.	2
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 bod 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(~~Summer~~ Winter Session)

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

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 Spectrophotometry	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 mixture.	2

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NACSC

Session 2019-20(Summer Session)

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

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	2
		genomes and are obligate intracellular	
		parasites.	
	Viroids	viroids are infectious agents that consist only of naked RNA without	2
		any protective layer such as a protein coat.	
		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	3
		lack a nucleus and other organelles.	

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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 metabolis 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 a 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:- Suvarna Telrande

Immunology

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Primary lymphoid organs	These organs include the bone marrow and the thymus. They create special immune system cells called lymphocytes.	2
	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	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 occuring 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
	Topoisomerases	Topoisomerases are nuclear enzymes that play essential roles in DNA replication, transcription chromosome segregation & recombination.	2
Unit II	Construction of genomic	DNA libraries are constructed by partially cutting the genome of interest with a restriction enzyme to generate	3

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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 Chang 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 Vaishette

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 betn 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.	3
Unit II	Antisense and	Antisense-oligonucleotides block translation of the mRNA or induce its degradation by RNase H, while	2

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	Ribozymes technology	Ribozymes and DNA enzymes possess catalytic activity and cleave their target DNA.	
	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. cancer is caused by changes to DNA.	4
Unit IV	Angiogenesis	Angiogenesis is the formation of new blood vessels. This process involves the migration, growth and differentiat 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

UV Eland 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	02
		restriction enzyme insert gene of interest. Recombinant DNA bacteria reproduce itself	
	Transfection	chemical and physical method, viral	
		Vectors, polyethylene, glycol, calcium	
		phosphate, coprecipitation, dimethyl	02
		Sulfoxide, liposomes, microinjection,	
		electroporation, Somatic cell fusion	
		gene transfer, Pronuclear microinjection	
	Amplification of DNA	polymerase chain Reaction.	
		Denaturation, Annealing, Extension.	
		Exponential amplification of target	03
		DNA with repeated cycling.	
		At different temperature each cycle	
		doubling the amount of DNA in	
		Sample Sensitivity required for.	
Unit II	Plant transformation Technology	experiment.	02
		Basic of tumor formation, hairy root, feature	

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

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Session 2019-20(Winter 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 acheivas by crossing together plant with redevant charcteristics and selecting the offspring with the desired combination of charcteristics	03
	Tissue culture medid	Tissue culture media is the source through which your plant receive nutrients for good and healthy It is combination of different component which provide diff nutrients.	02
	Organogenesis & Embryogenesis	The process of formtn of organs from three germ layers It concern cell cell interaction. The process that occur after the fertilization of an ovule to produce.	03 02
Unit II	Shoot tip culture	Shoot tip culture isolate from plants can multiply in the form of protocorn like body, axillary bud or shoot.	

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

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Winter
Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: M.Sc. (Sem III)
Subject:- Environmental science & Bioresource
Faculty:- Pooja Thote

Lesson Plan format

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

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

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Winter

Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: M.Sc. (III sem)
Subject:-
Faculty:- Vaibhavi ughade

Dignostic medical Biotechnology

Lesson Plan format			
Unit	**Topic Name**	**Topics Description**	**No. of Lecture Required**
Unit I	Host pathogen Interaction.	Microbes or virus ~~satisfy~~ sustain themself	02
		Ves within host organisms on molecules cellular, organism or populational	
		level. eves emerging and evolving field in dicipline of plant pathology.	
	Disease dignosis of disease.	Dignosis is hypothesis about the	
		nature of patients illness one ~~that~~ derived from observat^{n} by	03
		use of interference.	
	Bioinformatic tools for molecular dignosis.	BLAST is tool one of most widely used tools to gain sequence.	
		inform$^{t n}$ on finding similarity betwn DNA & Protein sequences against	04
		a database is one of the first thing people do when trying to get	
		immediate inform$^{t n}$ about a sequence of intrest.	
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.	
	Hybridisatn & Ligation based assay	Hybridizatn based assay contain the Southern blotting, nothern blotting PCR, Reverse transcriptase PCR, DNA microarrays	03
Unit III	Outline of typical Proteomic Experiment	The proteomic experiment mainly contain the sample preparation then various technique like 1D gel electrophoresis,	04
Unit IV	Biosensor	Biosensor is device that measure, biological or chemical reaction by generation sensors proportional to concn of analyte in the reaction,	02
	DNA nanosensor	are nanobiosensors mostly recognized and nanoparticles transducing component,	03
Unit V			

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NACSC

Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: M.Sc. (Sem IV)
Subject:-
Faculty:- Shubhangi Virshette

Biostatostics, Bioinformatics Ethics & patenting.

Lesson Plan format

Unit	Topic Name	Topics Description	No. of Lecture Required
Unit I	Biostatatics measure of dispersion	It is branch of stastics that	04
		applies statastical methods to wide	
		range of topics in biology, collection and analysis of data.	
	Reaserch design	overall Stratergy and analytical	
		approach that you have chose in	03
		order to integrate the different components of the study	
	phylogenetic clustring.	It contain sequence from different	
		patients which share recent common	02
		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	
		waste bioprocessing, carbon dioxide	02
		of raw material and many more.	
Unit IV	Patent & trademark	A patent protects new inventions	
		processes or scientific creations,	04
		trademark protects brands, logos &	
		Slogans.	
	IPR	Patent, copyright industrial design	04
		rights, trademark, geographical indications	
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 maintanance & proliferatn of animal cells that will continue to grow outside the living organisms if supplied with appropriate growth rate.	03
	Culture medium	It is gel or liquid that contains nutrients and is used to grow bacteria or microorganisms. It should be sterile and isotonic to culturing cells.	02
	Charteristics of cells in culture.	Cell line charcterization involves morphology biochemical and gene based charcterization, the species of origin, tissue of orgin 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 formed by culture cells directly obtained.	03

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		from tissue.	
	Established cell line culture.	culture will proliferate identicly	.04
		given appropriate fresh medium	
		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	03
		of culture system in stages from	
		laboratory to industry,	
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	Gene therapy.	02
		3D cell culture is culture environment	
Unit V	culture & tissue engineering	that allows cell to grow and	
		interact with surrounding extracellular	04
		framework assemble functional	
		construct that restore.	

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NACSC

Session 2019-20(Summer Session)

Department Name: Biotechnology
Course Name: M.Sc (sem IV)
Subject:-
Faculty:- Suvana 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
		use of living organism like microbes	
		and bacteria to decontaminated affected areas.	
	Vermi-composting	The process in which earthworm	
		convert the organic waste into	02
		manure rich in high nutritional content,	
	phyloremediation	The treatment of pollutants or	
		waste contaminated soil by use of	03
		green plants that remove degrade stabilize undesirable	
		substances.	
Unit II	Biomethylation	It is process by which organic	03
		material is microbiologicaly convert	

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

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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	02
		cure disease. by replacing disease causing gene.	
		Transplatation is surgical procedure,	
	tissue & organ transplantation	in which organ tissue or group of	03
		cell removed from one person to other.	
		transgenesis can be important for	
	Transgenesis and their uses	gene therapy where new gene	04
		can be inserted into patients	
		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	02
		a person's response to drugs person genetic make up.	

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

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