Effective from Session: 2024-25							
Course Code	B100101T/ BS103	**Title of the Course**	Introduction to Cell Biology and Genetics	**L**	**T**	**P**	**C**
Year	I	**Semester**	I	**3**	**1**	**0**	**4**
Pre-Requisite	10+2 Biology	**Co-requisite**					
Course Objectives	The objective of this course is to develop an understanding of basics of cell, cell organelles structure and functions, and basics of Mendelian Genetics.						

Course Outcomes	
CO1	Develop an understanding of the discovery of Cell; Historical prospective, Structural and functional differences between Prokaryotic and Eukaryotic cells, difference between animal and plant cells.
CO2	Develop an understanding about structure and functions of different cell organelles, cytoskeleton and cell motility.
CO3	Develop an understanding of different types of cell divisions, cell membrane and transport across the cell membrane, cell-cell communication, signal transduction and cell death.
CO4	Develop an understanding about Chromosomes, there composition, structure and functions, Mendelian genetics, variations from mendelian genetics, Linkage and mechanism & importance of crossing over.
CO5	Develop an understanding of gene mutations in plant, animals and bacteria, its types and economic importance. Karyotyping, Chromosomal aberrations in human and associated diseases, various types of DNA damages and their repair mechanisms.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Cell as a Basic unit of Living Systems**	Discovery of cell, The Cell theory Ultrastructure of an eukaryotic cell – (both plant and animal cell).	**6**	CO.1
2	**Cell organelles and cytoskeleton**	Structure and functions of cell organelles, Cytoskeletal structures (Microtubules, Microfilaments); cell motility.	**8**	CO.2
3	**Cell Division and Membrane Transport**	Cell cycle, mitosis and meiosis, Membrane transport: active and passive transport.	**8**	CO.3
4	**Cell signaling & Cell Death**	Introduction to signal transduction and its molecular mechanism, cell senescence, Programmed Cell Death.	**6**	CO.3
5	**Chromosomes: Structural Organization**	Centromere, telomere, chromonema, euchromatin and heterochromatin, chemical composition and karyotype, nucleosome model, Special types of chromosomes: Salivary gland and Lampbrush chromosomes, Chromosomal Variations, Chromosome mapping, structural and numerical aberrations.	**8**	CO.4
6	**Mendelism**	Mendel's laws of heredity, Test cross, Incomplete dominance and simple problems, Interaction of Genes: Supplementary factors, Comb pattern in fowls, Complementary genes: Flower color in sweet peas, Multiple factors: Skin color in human beings, Epistasis: Plumage colour in poultry, Multiple allelism: Blood groups in human beings, Concepts of allosomes and autosomes, XX-XY, XX-XO, ZW-ZZ, ZO-ZZ type, Linkage and Crossing Over, Mechanism and importance.	**8**	CO.4
7	**Mutations**	Spontaneous and induced mutations, Physical and chemical mutagens, Mutation at the molecular level, Mutations in plants, animals, and microbes for economic benefit of man. Human Genetics: Karyotype in man, inherited disorders: Allosomal (Klinefelter syndrome and Turner's syndrome), Autosomal (Down syndrome and Cri-Du- Chat syndrome).	**8**	CO.5
8	**DNA Damage and Repair**	DNA Damage and Repair: Causes and Types of DNA damage, Major mechanisms of DNA repair: photoreactivation, nucleotide and base excision repairs, mismatch repair, SOS repair.	**8**	CO.5

Reference Books:

Molecular Biology of cell – Bruce Alberts et al, Garland publications

Animal Cytology & Evolution – MJD, White Cambridge University Publications

Molecular Cell Biology – Daniel , Scientific American Books.

Cell Biology & Molecular Biology – EDP Roberties & EMF Roberties, Sauder College.

Principles of Genetics – E.J. Gardener, M.J. Simmons and D.P. Snustad, John Wiley & Sons Publications

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1					1	2	2	1	
CO2	3	1					1	3	2	2	
CO3	3	1					1	3	2	3	
CO4	3	1					1	3	2	3	
CO5	3	1					1	3	2	3	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25						
Course Code	B110101T / BS142	**Title of the Course**	Fundamentals of Biochemistry	**L**	**T**	**P**
Year	I	**Semester**	I	**3**	**1**	**0**
Pre-Requisite	10+2	**Co-requisite**				
Course Objectives	**The objective of this course is to develop an understanding of basics of biomolecules.**					

Course Outcomes	
CO1	To understand basic details of Normality, Molarity, Molality, per cent solutions, mole fractions, w/v and v/v solutions.Concept of pH, water as well as carbohydrate molecules and its classification.
CO2	To understand basic details of amino acid; protein molecules and its classification.
CO3	To understand basic details of lipid molecules and its classification.
CO4	To understand basic details of nucleic acid molecules and its classification.
CO5	To understand basic details of vitamin, Plant and animal hormones and their classification.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Basics of Biochemistry**	General idea about Normality, Molarity, Molality, per cent solutions, mole fractions, w/v and v/v solutions. Concept of pH, water : a universal solvent.	6	**CO1**
2	**Carbohydrates**	Carbohydrates: structure, classification and properties of Monosaccharides, Disaccharides, and Polysaccharides (starch, glycogen, peptidoglycan, cellulose).	8	**CO1**
3	**Amino acids and proteins**	Structure, classification and properties of amino acids, peptide bond, proteins: primary, secondary (α-Helix, beta-pleated sheet), tertiary and quaternary structures, Ramachandran plot, structure of hemoglobin and myoglobin.	8	**CO2**
4	**Lipids and fats**	Lipids: Structure, function, classification and properties of Fatty acids, Glycerolipid, Cholesterol, Sphingolipid, Phospholipids, Lipoproteins.	8	**CO3**
5	**Nucleic acids**	Purines and pyrimidines, nucleosides, nucleotides, polynucleotides, DNA types: A DNA, B DNA and Z DNA and their function, RNA types: mRNA, rRNA and tRNA and their function, Forces stabilizing nucleic acidstructure.	8	**CO4**
6	**Vitamins**	Structure, sources, dietary requirements, function and deficiency disorders of water (B, C) and fat soluble vitamins (A, D, E and K).	8	**CO5**
7	**Plant hormones**	Plant hormones classification and function. Auxin, gibberellins, cytokinins, ethylene and abscisic acid.	6	**CO5**
8	**Animal hormones**	Animal hormones secreted by endocrine glands Hypothalamus, pituitary, thyroid gland, adrenal gland, pancrease and gonads. Their classification and function	8	**CO5**

Reference Books:

Principles of Biochemistry- AlbertL. Lehninger CBS Publishers & Distributors

Biochemistry – Lubertstryer Freeman International Edition.

Biochemistry – Keshav Trehan Wiley Eastern Publications

Fundamentals of Bochemistry-J.L.JainS.Chand and Company

The Biochemistry of Nucleic acid – Tenth Edition-Roger L.P.Adams, John T. Knowler and David P.Leader, Chapman and Hall Publications

Textbook of Organic Chemistry (A Modern Approach)

e-Learning Source:

https://www.khanacademy.org/

www.coursera.com

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1					1	3		1	2
CO2	3	1					1	3		2	2
CO3	3	1					1	3		3	2
CO4	3	1					1	3		3	2
CO5	3	1					1	3			

2- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B100103P/BS105	**Title of the Course**	Introduction to Cell Biology & Genetics Lab	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	I	**0**	**0**	**4**	**2**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	The objective of this course is to develop the understanding of use of Micrometer and calibration, measurement of onion epidermal cells and yeast, Cell division processes: Mitotic and meiotic studies, Chromosomes: polytene chromosomes, Karyotype analysis – with the help of slides and how to make Blood smear – differential staining and Buccal smear – Barr bodies.						

Course Outcomes	
CO1	Comprehend the use of Micrometer and calibration, measurement of cells
CO2	Have knowledge and can evaluate Cell division: Mitosis and meiosis
CO3	Analyze Chromosomes.
CO4	Have knowledge of types of chromosomes as polytene chromosomes
CO5	Make and analyze Blood smear – differential staining, Buccal smear – Barr bodies

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Exp 1	Use of Micrometer and calibration, measurement of onion epidermal cells and yeast cells.	4	**CO1**
2	Exp 2	Cell division: Mitotic studies in onion root tips	4	**CO2**
3	Exp 3	Cell division: Meiotic studies in grasshopper testes or flower bud	4	**CO2**
4	Exp 4	Chromosomes: Mounting of polytene chromosomes	4	**CO3**
5	Exp 5	Buccal smear – Barr bodies	4	**CO5**
6	Exp 6	Karyotype analysis – with the help of slides	4	**CO4**
7	Exp 7	Study of polytene chromosomes by slides	2	**CO4**
8	Exp 8	Blood smear – differential staining	4	**CO5**

Reference Books:

RF. (2012) Biochemistry laboratory: modern theory and techniques (2nd Edition). Pearson Education, Inc

e-Learning Source:

https://vlab.amrita.edu/index.php?brch=188&cnt=1&sim=1102&sub=3

https://vlab.amrita.edu/?sub=3&brch=188&sim=1102&cnt=2106

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1		3		3	1	3	2	3	
CO2	3	1		3		3	1	1		3	
CO3	3	1		3		3	1				3
CO4	3	1		3	3	3	1				3
CO5	3	1									

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B110102P /BS143	**Title of the Course**	Analytical Biochemistry Lab	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	I	**0**	**0**	**4**	**2**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	The objective of this course is to familiarize the students with basic instruments used in Biochemistry and practical learning of Biomolecules.						

Course Outcomes	
CO1	Qualitative test for carbohydrates (Molisch test, Benedict test, Fehling test, Bradford and Iodine tests).
CO2	Estimation of vitamin C and Determination of pK A of glycine.
CO3	Perform spot test for amino acids in a given sample.
CO4	Estimate cholesterol in a given sample.
CO5	Perform DNA and RNA estimation in a given sample.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Exp 1	Qualitative test for carbohydrates (Molisch test, Benedict test, Fehling test,Bradford and Iodine tests).	6	**CO1**
2	Exp 2	Estimation of vitamin C and Determination of pK A of glycine.	6	**CO2**
3	Exp 3	Perform spot test for amino acids in a given sample.	6	**CO3**
4	Exp 4	Estimate cholesterol in a given sample.	6	**CO4**
5	Exp 5	Perform DNA and RNA estimation in a given sample.	6	**CO5**

Reference Books:

Books recommended: Boyer RF. (2012) Biochemistry laboratory: modern theory and techniques (2nd Edition). PearsonEducation, Inc.

e-Learning Source:

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1						3		3	
CO2	3	1		3		3	1	3	2	3	
CO3	3	1		3		3	1	1		3	
CO4	3	1		3		3	1				
CO5	3	1		3	3	3	1				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B110205V/BS146	**Title of the Course**	Basic Microbiology and Biosafety Measures	**L**	**T**	**P**	**C**
Year	1	**Semester**	I	**2**	**0**	**1**	**3**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	On completion of this course, students will be able to develop an understanding of basics of microbiology, general classification of microbes, control of microorganisms, basics of recombination in prokaryotes, microbial interaction with environment.						

Course Outcomes	
CO1	Know the basics of microbiology, bacteriophage, stains and staining techniques, general classification of microbes.
CO2	Understand basics of structure of bacterial cell.
CO3	Study control measures for microorganisms.
CO4	Know the economic and pathogenic importance of microorganisms.
CO5	Discuss bio-safety measures.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Microorganisms, Traditional Indian Knowledge**	Theory: Difference between prokaryotic and eukaryotic microorganisms. General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance. Fermentation in Ayurvedic medicine. Practical: Demonstration of fermentation process.	8	**CO1**
2	**Structure of bacterial cell**	Theory: Ultrastructure of bacterial cell, Composition and detailed structure of gram positive and gram-negative cell walls, Archaebacterial cell wall, Gram and acid-fast staining mechanisms, lipopolysaccharide (LPS). Effect of antibiotics and enzymes on the cell wall. Structure, function and chemical composition of bacterial cell membranes. Cytoplasm: Ribosomes, mesosomes, inclusion bodies, nucleoid, chromosome and plasmids. Endospore: Structure, formation, stages of sporulation. Practical: Bacterial media preparation, culture, and growth curve determination.	8	**CO2**
3	**Control of microorganisms**	Theory: Sterilization-physical agents (autoclave, hot air oven, laminar air flow and membrane filter), chemical agents (Alcohol, Halogens and Gaseous agents, antibiotics), radiation methods (UV rays). Practical: Sterilization of media.	8	**CO3**
4	**Economic & pathogenic importance of microorganisms**	Theory: Common pathogenic microorganisms- bacterial gall, viral (TMV), fungal (red rot disease of sugar cane), multidrug resistance, *Mtb*. Fermentation: ethanol & antibiotics production. Practical: Demonstration of bioreactor working.	8	**CO4**
5	**Bio-safety measures**	Theory: Historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; biosafety guidelines - Government of India; definition of GMOs; roles of Institutional Biosafety Committee, RCGM, GEAC etc. Practical: Demonstration of different Biosafety cabinets.	8	**CO5**

Reference Books:

Srilakshmi B (2018): Food Science, 7th Colour Ed. New Age International (P) Ltd.

Mann J and TruswellS (2017): Essentials of Human Nutrition, 5th Ed. Oxford University Press.

Srilakshmi B (2017): Nutrition Science,6th Multicolour Ed. New Age International (P) Ltd.

e-Learning Source:

https://www.khanacademy.org/

www.coursera.com

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1					1	2	2	1	
CO2	3	1					1	3	2	2	
CO3	3	1					1	3	2	3	
CO4	3	1					1	3	2	3	
CO5	3	1					1	3	2	3	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	Z010101T/ BE105	**Title of the Course**	Food, Nutrition, and Hygiene	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	I	**2**	**0**	**0**	**2**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	**To learn the basic concept of food, nutrition, hygiene, and common diseases prevalent in society along with 1000 days nutrition concept**						

Course Outcomes	
CO1	To learn the basic concept of the Food and Nutrition, and meal planning
CO2	To learn about macro and micronutrientsand theirs RDA, sources, functions, deficiency, and excess.
CO3	To learn 1000 days Nutrition Concept and study the nutritive requirement during special conditions like pregnancy and lactation.
CO4	To study common health issues in the society and to learn the special requirement of food during common illness.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Concept of Food and Nutrition	(a) Definition of Food, Nutrients, Nutrition, Health, balanced Diet (b) Types of Nutrition- Optimum Nutrition, under Nutrition, Over Nutrition (c) Meal planning- Concept and factors affecting Meal Planning (d) Food groups and functions of food	8	CO1
2	Nutrients: Macro andMicro RDA, Sources, Functions, Deficiency and excess of	(a) Carbohydrate (b) Fats (c) Protein (d) Minerals Major: Calcium, Phosphorus, Sodium, Potassium Trace: Iron, Iodine, Fluorine, Zinc (e) Vitamins Water soluble vitamins: Vitamin B, C Fat soluble vitamins: Vitamin A, D, E, K (f) Water (g) Dietary Fibre	7	CO2
3	1000 days Nutrition	(a) Concept, Requirement, Factors affecting growth of child (b) Prenatal Nutrition (0 - 280 days): Additional Nutrients' Requirement and risk factors during pregnancy (c) Breast / Formula Feeding (Birth – 6 months of age) Complementary and Early Diet (6 months – 2 years of age)	8	CO3
4	Community Health Concept	(a) Causes of common diseases prevalent in the society and Nutrition requirement in the following: Diabetes Hypertension (High Blood Pressure) Obesity Constipation Diarrhea Typhoid	7	CO4
5	Community Health Concept	(b) National and International Program and Policies for improving Dietary Nutrition (c) Immunity Boosting Food	4	CO5

Reference Books:

Singh, Anita, "Food and Nutrition", Star Publication, Agra, India, 2018.

SheelSharma,Nutrition and Diet Therapy,Peepee Publishers Delhi,2014,First Edition.

1000Days-Nutrition_Brief_Brain-Think_Babies_FINAL.pdf

https://pediatrics.aappublications.org/content/141/2/e20173716

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750909/

e-Learning Source:

https://www.udemy.com/course/internationally-accredited-diploma-certificate-in-nutritionDiploma in Human Nutrition-Revised Offered by Alison

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)												
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	-	-	-	2	2	3	2	3	3	2	2		
CO2	-	-	-	3	2	3	2	3	3	2	2		
CO3	-	-	-	3	3	2	3	3	-	-	2		
CO4	-	-	3	3	3	3	3	3	3	2	3		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	A050101T/ HM101	**Title of the Course**	RASHTRA GAURAV	**L**	**T**	**P**	**C**
Year	First	**Semester**	Second	**2**	**0**	**0**	**2**
Pre-Requisite	10+2	**Co-requisite**	None				
Course Objectives	The objective of the course on "Rashtra Gaurav" is to explore and critically analyze the multifaceted dimensions of national pride and glory, as depicted in the paper. Participants will delve into the historical, cultural, social, and political aspects that contribute to the concept of "Rashtra Gaurav" (National Pride) in the context of the specific themes and perspectives presented in the paper. Through in-depth discussions, readings, and interactive sessions, participants will gain a comprehensive understanding of the factors that shape and define a nation's sense of pride, and how these factors influence individual and collective identities. The course aims to foster a nuanced appreciation for the significance of "Rashtra Gaurav" in contemporary society, encouraging participants to critically evaluate its implications and applications within diverse global contexts.						

Course Outcomes	
CO1	To understand the basics of Indian Society and culture.
CO2	To analyze the fundamental issues in India.
CO3	To understand Indian Heritage.
CO4	To examine the philosophical and spiritual developments in India.
CO5	To evaluate the contributions of Major National Characters and Personalities.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INDIAN SOCIETY & CULTURE	• Unity in Diversity • Art forms, Literature, Culture from Ancient to Modern time. • National and International Awards & Awardees	05	01
2	ISSUES IN INDIA	• Issues of Gender Equality and role of Women Organisations • Issues of Poverty and Development • Social Empowerment through Social Movements in India	05	02
3	INDIAN HERITAGE	• Cultural Heritage in India: Buddhist Monuments at Sanchi, Ajanta & Ellora Caves, Khajuraho, Taj Mahal • Tourist Places in India: Red Fort, Ambar Palace, Kaziranga National Park, Ram Mandir (Ayodhya)	04	03
4	PHILOSOPHICAL AND SPIRITUAL DEVELOPMENTS	• Sufism & Bhakti Movement: Bulleh Shah, Data Ganj Baksh, Khwaja Moinuddin Chishti, and Nizamuddin Auliya.Tulsidas, Surdas, Meera, Nank & Kabir • Jainism: Mahavir's biography and education • Buddhism: The life of Buddha, Contributions of Buddhism to India's Culture	05	04
5	MAJOR NATIONAL CHARACTERS AND PERSONALITIES	• Ashoka the Great and His Dhamma • Raja Ram Mohan Roy & Brahmo Samaj • Savitribai Phule: A Social Reformer and contribution in Women Education • Swami Vivekanand and his philosophies • Mahatma Gandhi: Role of Gandhi in Indian National Movement • Dr. Bhimrao Ambedkar: A Chief architect of the Indian Constitution	06	05

Reference Books:

Jawaharlal Nehru - "The Discovery of India"
B.R. Ambedkar - "Annihilation of Caste"
Ramachandra Guha - "India After Gandhi: The History of the World's Largest Democracy"
Mahatma Gandhi – "My Experiment with Truth"
S C Dubey- "Indian Society"
Nadeem Hasnain – "Indian Society and Culture" G Shah- "Social Movements in India"

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)									
PO-PSO CO	PO1	PO2	PO3	PO4	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	3	3	2	2	3	2	1	2
CO2	3	2	2	3	1	2	3	1	2	1
CO3	1	2	2	2	2	3	2	3	3	2
CO4	1	3	2	3	2	3	2	3	1	3
CO5	2	3	1	2	2	3	1	3	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign and seal of HoD**

Effective from Session: 2024-25							
Course Code	B100201T/BS115	**Title of the Course**	Human Physiology	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	II	**3**	**1**	**0**	**4**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	This course is designed to enable the students to develop the understanding of the basic of organs and organ system and their physiological importance.						

Course Outcomes	
CO1	Summarize the digestion: Mechanism of digestion & absorption of carbohydrates, Proteins, Lipids and nucleic acids. Composition of bile, Saliva, Pancreatic, gastric and intestinal juice
CO2	Will understand about respiration: Exchange of gases, Transport of O2 and CO2, Oxygen dissociation curve, Chloride shift, composition of blood, Plasma proteins & their role, blood cells, Haemopoisis, Mechanism of coagulation of blood.
CO3	Summarize excretion: modes of excretion, Ornithine cycle, Mechanism of urine form
CO4	Discuss mechanism of working of heart: Cardiac output, cardiac cycle, Origin & conduction of heart beat, and ECG, Structure of cardiac, smooth & skeletal muscle, threshold stimulus, All or None rule, single muscle twitch, muscle tone, isotonic and isometric contraction, Physical, chemical & electrical events of mechanism of muscle contraction, mechanism of generation & propagation of nerve impulse, structure of synapse, synaptic conduction, salutatory conduction, Neurotransmitters
CO5	Discuss mechanism of action of hormones (insulin and steroids), Different endocrine glands– Hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenals, hypo & hyper-secretions.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Digestion: structure of digestive system and mechanism	Digestion: structure of digestive system, Mechanism of digestion & absorption of carbohydrates, Proteins, Lipids and nucleic acids. Composition of bile, Saliva, Pancreatic, gastric and intestinal juice	8	CO1
2	Respiration	Respiration: structure of lungs, Exchange of gases, Transport of O2 and CO2, Oxygen dissociation curve, Chloride shift.	7	CO2
3	Blood composition and coagulation	Composition of blood, Plasma proteins & their role, blood cells, Haemopoiesis, Mechanism of coagulation of blood.	8	CO2
4	Mechanism of working of heart	Mechanism of working of heart: structure of heart, Cardiac output, cardiac cycle, Origin & conduction of heart beat and ECG, double and single circulation	7	CO4
5	Structure of muscles	Structure of cardiac, smooth & skeletal muscle, threshold stimulus, All or None rule, single muscle twitch, muscle tone, isotonic and isometric contraction, Physical, chemical & electrical events of mechanism of muscle contraction.	7	CO4
6	structure of kidney	Excretion: structure of kidney and nephron, modes of excretion, Ornithine cycle, Mechanism of urine formation.	8	CO3
7	Mechanism of nerve impulse	Mechanism of generation & propagation of nerve impulse, action potential, structure of synapse, synaptic conduction, saltatory conduction, Neurotransmitters	5	CO4
8	Mechanism of action of hormones	Mechanism of action of hormones (insulin and steroids), Different endocrine glands– Hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenals, hypo & hyper-secretions.	10	CO5

Reference Books:

1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B. Saunders Company.

2.FoxSI – HumanPhysiology,(1998): (McGrawHill,,ISBN:0071157069)

3. Tortora ,G.J.&Grabowski,S.(2006).Principal of Anatomy &Physiolohy.XIEdition.Johnwiley&sons,Inc.

e-Learning Source:

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)												
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	**3**					**1**	**2**	3		1			
CO2	**3**					**1**	**1**	3		1			
CO3	**3**					**1**	**1**	3		1			
CO4	**3**			**1**		**1**	**1**		2	1			
CO5	**3**			**1**		**1**	**1**		2	1			

2- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B110203T /BS154	**Title of the Course**	Clinical Biochemistry	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	**3**	**1**	**0**	**4**
Pre-Requisite	10+2 with Biology	**Co-requisite**					
Course Objectives	**This course is designed to enable the students to develop the understanding of the basic of various clinical test for different biomolecules along with metabolisms.**						

Course Outcomes	
CO1	Discuss what standard solution, specimen collection and processing (Blood, urine, faeces) and how to transport of specimens.
CO2	Explain the composition and their functions, erythrocyte indices. Clotting time, Bleeding time, Prothrombin time, and Complete blood count, determination of Hb, PCV and ESR. Anticoagulant preservatives for blood and urine, Blood coagulation system, Anemia:- classifications, Hemoglobinopathies, Thalassemias.
CO3	Discuss the dorder in carbohydrate metabolism: Regulation of blood sugar, Glycosuria-types of glycosuria. Oral glucose tolerance test in normal and diabetic condition. Diabetes mellitus and Diabetic insipidus - hypoglycemia, hyperglycemia. Ketonuria, ketosis. Disorder in lipid metabolism: Lipid and lipoproteins: Classifications, composition, mode of action. Cholesterol: Factors affecting blood cholesterol level. Dyslipoproteinemias, atherosclerosis, risk factor and fatty liver.
CO4	Explain the Liver function test: Metabolism of bilirubin, jaundice - types, differential diagnosis. Liver function test –Icteric index, Vandenberg test, plasma protein changes. Involvement of enzymes in diagnostics of heart disease including aspartate transaminase, isoenzymes of creatine kinase and troponin. Clinical significance of SGOT, SGPT,ALP, ACP, CPK and LDH
CO5	Describe the Renal function test: Clearance test–Urea, Creatinine, Inulin, para-aminohippuric acid (PAH) test,Concentration and dilution test.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Basics of clinical biochemistry**	A brief review of units and abbreviations used in expressing concentrations and standard solutions. Specimen collection and processing (Blood, urine, faeces). Transport of specimens.	6	**CO1**
2	**Blood composition andcounts**	Composition and their functions, erythrocyte indices. Clotting time, Bleeding time, Prothrombin time, and Complete blood count, determination of Hb, PCV and ESR.	8	**CO1**
3	**Blood preservatives and relateddiseases**	Anticoagulant preservatives for blood and urine, Blood coagulation system, Anemia:- classifications, Hemoglobinopathies, Thalassemias.	8	**CO2**
4	**Disorder in carbohydrate metabolism**	Regulation of blood sugar, Glycosuria-types of glycosuria. Oral glucose tolerance test in normal and diabetic condition. Diabetes mellitus and Diabetic insipidus - hypoglycemia, hyperglycemia. Ketonuria, ketosis.	8	**CO3**
5	**Disorder in lipid metabolism**	Lipid and lipoproteins: Classifications, composition, mode of action. Cholesterol: Factors affecting blood cholesterol level. Dyslipoproteinemias, atheroscelorosis, risk factor and fatty liver.	8	**CO4**
6	**Liver function test**	Metabolism of bilirubin, jaundice - types, differential diagnosis. Liver function test- Icteric index, Vandenberg test, plasma protein changes. Involvement of enzymes in diagnostics of heart disease including aspartatetransaminase, isoenzymes of creatine kinase and troponin.	8	**CO5**
7	**Renal functiontest**	Clearance test–Urea, Creatinine, Inulin, para-aminohippuric acid (PAH) test, Concentration and dilution test.	8	**CO5**
8	**Enzymology**	Clinical significance of SGOT, SGPT, ALP, ACP, CPK and LDH	6	**CO4**

Reference Books:

Medical Biochemistry by MN Chatterjee, Rana Shinde, 8 edition, 2013, Jaypee publications.

Textbook of Medical Laboratory Technology by Praful B. Godkar and Darshan P. Godkar th

Medical Laboratory Technology by Ramnik sood, 5 Edition, 1999, Jaypee publishers.

e-Learning Source:

https://www.khanacademy.org/

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3					1	2	3		2	
CO2	3					1	1	3		2	
CO3	3					2	1	3	1	2	
CO4	3				2	1	1		1	1	
CO5	3				1	1	1			1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B100202P/BS152	**Title of the Course**	Human Physiology Lab	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	**0**	**0**	**6**	**2**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	This course is designed to develop the understanding of the basic knowledge of Blood grouping, blood coagulation, haemoglobin, TLC, DLC and enzyme action.						

Course Outcomes	
CO1	Analyze Blood Grouping
CO2	Perform and analyze counting of RBCs,TLC and DLC
CO3	Perform and analyze coagulation of blood
CO4	Have knowledge of enzyme action
CO5	Perform and analyze Haemoglobin

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Exp -01**	Finding the coagulation time of blood	10	**CO1**
2	**Exp -02**	Determination of blood glucose level with the help of glucometer.	10	**CO2**
3	**Exp -03**	Counting of mammalian RBCs	10	**CO3**
4	**Exp -04**	Determination of TLC and DLC	10	**CO4**
5	**Exp -05**	Estimation of haemoglobin by haemocytometer.	10	**CO5**
6	**Exp -06**	Demonstration of action of salivary amylase enzyme from saliva.	10	**CO4**

Reference Books:

1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B. Saunders Company.

2.FoxSI – HumanPhysiology,(1998): (McGrawHill,,ISBN:0071157069)

3.Tortora ,G.J.&Grabowski,S.(2006).Principal of Anatomy &Physiolohy.XIEdition.Johnwiley&sons,Inc.

e-Learning Source:

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)												
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO6	PSO7
CO1	3	3	1				3	3	3	3	1		
CO2	3	3	1				3	3	3	3	1		
CO3	3	3	1				3	3	3	3	1		
CO4	3	3	1				3	3	3	3	1		
CO5	3	3	1				3	3	3	3	1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2023-24							
Course Code	B110204P/ BS155	**Title of the Course**	Clinical Biochemistry Lab	**L**	**T**	**P**	**C**
Year	1st year	**Semester**	II	**0**	**0**	**6**	**2**
Pre-Requisite	**10+2**	**Co-requisite**					
Course Objectives	This course is designed to develop the understanding of the basic knowledge of haemoglobin, diabetes, cholesterol, urea, creatinine, ALP, SGOT and SGPT						

Course Outcomes	
CO1	Understand the basics of haemoglobin analysis
CO2	Learn basics of diabetes determination
CO3	Have knowledge about serum cholesterol and urea estimation
CO4	Learn basics of creatinine, alkaline phosphatase, SGOT and SGPT
CO5	Understand specific gravity of urine

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Exp -01**	Estimation of haemoglobin by cyanmethemoglobin method	4	**CO1**
2	**Exp -02**	Determination of serum albumin-globlin (A-G) ratio in blood	4	**CO1**
3	**Exp -03**	Quantitative analysis of blood sugar by glucometer and GOD-POD method	4	**CO2**
4	**Exp -04**	Determination of serum total cholesterol	4	**CO3**
5	**Exp -05**	Analysis of blood urea in serum	4	**CO3**
6	**Exp -06**	Estimation of serum creatinine and alkaline phosphatase activity	4	**CO4**
7	**Exp -07**	Quantitative analysis of SGOT and SGPT	4	**CO4**
8	**Exp -08**	Determination of specific gravity of urine	4	**CO5**

Reference Books:

1. Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. JohnWiley-Liss Inc. Publication.
2. Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
3. A Manual of Lab Techniques, NIN, Hyderabad

e-Learning Source:

https://vlab.amrita.edu/

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)												
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO6	PSO7
CO1	3						3	3		3			
CO2	3						3	3		3			
CO3	3						3	3		3			
CO4	3						3	3		3			
CO5	3						3	3		3			

Name & Sign of Program Coordinator	Sign & Seal of HoD

Effective from Session: 2024-25							
Course Code	B030202T/MT148	**Title of the Course**	Basic Mathematics & Statistic	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**3**	**1**	**0**	**4**
Pre-Requisite		**Co-requisite**					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of elementary mathematics. By using the principal of applied mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will able to explore subject into their respective dimensions						

Course Outcomes	
CO1	Students will be able to interpret limits and continuity of functions. Also they can find differential coefficient, differentiation of functions including function of a function, differentiation of parametric form, simple and successive differentiation.
CO2	Students will evaluate and interpret integration as an inverse of differentiation; They will be able to find indefinite integrals of standard form, integration by parts, by substitution and by partial fraction method. They can evaluate definite integrals.
CO3	Students can describe the basic concepts of simple random sampling and stratified random sampling. They can understand and find measures of central tendency (mean, median and mode), measures of variation (mean deviation and standard deviation), measure of coefficient if variation. Student will be able to understand and evaluate covariance and correlations, Karl Pearson's Coefficient of correlation and Spearman's coefficient of rank correlation. They can also be able to find regression by method of least squares.
CO4	Students can interpret the fundamental principle of counting. They will also be able to find permutations, permutations under certain conditions, combinations, combinatorial identities. They can also apply Binomial theorem (without proof)
CO5	Students will be able to understand the random experiment and associated sample space, events. They can also find probability and can use addition and multiplication theorems for finding probability (without proof). They will be able to understand probability distributions, and will be able to find Binomial, Poisson and Normal distributions.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Limit and continuity**	Set and functions, left hand limit and right hand limit, limits of function, continuity of function	7	**1**
2	**Differentiability**	Definition of differential coefficient, differentiation of function including function of a function, differentiation of parametric form, simple and successive differentiation, Leibnitz rule	8	**1**
3	**Integrations**	Integration as inverse of differentiation, indefinite integrals of standard form, integration by parts, substitution method and partial fraction method. evaluation of definite integrals.	8	**2**
4	**UnivariateStatistics**	Basic concepts of simple random sampling and stratified random sampling, measures of central tendency (mean, median and mode), measures of variation (mean deviation, quartile deviation and standard deviation), coefficient of variation	7	**3**
5	**BivariateStatistics**	Covariance, correlations, scatter diagram, Karl Pearson's coefficient of correlation, Spearman'scoefficient of rank correlation, regression and its coefficient, estimation of regression lines by the method of least square	7	**3**
6	**Permutations and Combinations**	Fundamental principle of counting, permutations, permutations under certain conditions, combinations, combinatorial identities, Binomial theorem (without proof), some applications of Binomial theorem	7	**4**
7	**Probabilitytheory**	Random experiment and associated sample space, events, definition of probability, algebra ofevents, addition and multiplication theorems on probability (without proof), conditional probability, Baye's theorem	8	**5**
8	**Probability Distributions**	Probability distribution, probability mass function, probability distribution function, expectations, Binomial, Poisson, normal distributions and their mean and variance, fitting the expected frequency of Binomial and Poisson distributions.	8	**5**

Reference Books:

1. Murray R. Spiegel, 1980, Probability and Statistics, Schaum's (Outline Series) McGraw-Hill Book Co.
2. Q. S. Ahmad, V. Ismail and S. A. Khan: Biostatistics, Laxmi Publications Pvt. Ltd.
3. E. Kreyszig, "Advanced Engineering Mathematics", 5th Edition, Wiley Eastern, 1985.

e-Learning Source:

1. NPTEL, MOOC

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)											
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	`	1	-	-	-	-	3	2	-	-	2	2
CO2	3	1	-	-	-	-	3	2	-	-	2	1
CO3	3	3	-	-	-	-	3	2	-	-	1	2
CO4	3	1	-	-	-	-	-3	2	-	-	2	3
CO5	3	3	-	-	-	-	3	2	-	-	2	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	**LN110/A040203T**	**Title of the Course**	Aspects & Approaches to Communication	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st and 2nd**	**5**	**1**	**0**	**6**
Pre-Requisite	**10+2**	**Co-requisite**	**None**				
Category	**Minor**						

Course Outcomes: After completing the course students shall be able to.	
CO1	Students will develop a basic understanding of Communication and professional communication
CO2	Students will be able to understand the importance of communicative English and its role in academic and non-academic environments
CO3	They will develop an understanding of English as a Language and its linguistic approaches.
CO4	They will develop an insight into Listening Skills to face the challenges of the professional world.
CO5	They will analyze and understand the concept of speaking skills in various situations

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Title of the unit: Professional Communication**	Professional Communication: Its Meaning and Importance, Essentials of Effective Communication, Barriers toEffective Communication. Communication Techniques	18	CO1
2	**Communication in English:**	Age of Globalization and the need to communicate in English, English as the first or Second Language. Uses of English in academic and non-academic situations in India	18	CO2
3	**Language Acquisition and Language Learning**	Language: Definition, characteristics, and importance of Language Linguistics: Definition, nature, scope, branches, levels, and types of Linguistics, Organs of Speech	18	CO3
4	**Communication Skills: Listening Skills**	Active listening Benefits of Effective Listening Barriers to Listening **Communication Skills: Speaking Skills** International Phonetic Alphabet (IPA Symbol)	18	CO4
5	**Communication Skills: Reading Skills**	Purpose, Process, Methodologies Skimming and Scanning **Communication Skills: Writing Skills** Elements of Effective Writing Precis Writing Note-taking	18	CO5

Reference Books:

1-Kumar, Sanjay and Pushp Lata., Communication Skills. Oxford University Press, Oxford 2011

2-Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Principals and Practice. Second Edition, Oxford University Press, 2012

3-Raina, Roshan Lal, Iftikhar Alam, and Faizia Siddiqui, Professional Communication. Himalaya Publication House 2012.

4-Agarwal, Malti. Professional Communication. Krishna's Educational Publishers. 2016.

5-http://www.uptunotes.com/notes-professional-communication-unit-i-nas-104..

6- https://www.docsity.com/en/subjects/professional-communication/

7- https://www.docsity.com/en/subjects/professional-communication/

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)											
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		3	3	2	1		2		2		2	
CO2		3	3	2	1		2		2		2	
CO3		3	3	2	1		2		2		2	
CO4		3	3	2	1		2		2		2	
CO5		3	3	2	1		2		2		2	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correla

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B100205V/ BS381	**Title of the Course**	Food Adulteration	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**2**	**0**	**1**	**3**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	**To learn the basic concept of food adulteration and its prevalence in society along with consumer rights**						

Course Outcomes	
CO1	Describe adulteration and its effect on health
CO2	Describe adulteration of different food items and methods of detection
CO3	To Understand laws related to food adulteration
CO4	To understand consumer rights and responsibilities related to food adulteration
CO5	To understand commonly used food additives and their harmful effects

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Common Foods and Adulteration**	Theory: Adulteration- Definition, Types- Poisonous substances, Foreign matter, Cheap substitutes, Spoiled parts. Common Foods subjected to adulteration. International and incidental. General Impact on Human Health. Practical: Methods for detecting adulterants in milk.	8	**CO1**
2	**Adulteration of Common Foods and Methods of Detection**	Theory: Means of Adulteration, Methods of Detection Adulteration in the following: Foods,Oil, and Grains. Sugar Additives and Sweetening agents. Practical: Methods of detecting adulterants present in common food items including processed food.	8	**CO2**
3	**Present Laws and Procedures on Adulteration**	Theory: Highlights of Food Safety and Standards Act 2006 (FSSA), Food Safety and Standards Authority of India, Rules and Procedures of Local Authorities. Role of voluntary agencies such as, Agmark, I.S.I. Quality control laboratories of companies, Private testing laboratories, Quality control laboratories of consumer co- operatives. Practical: Case studies involving food safety issues.	8	**CO3**
4	**Consumer rights**	Theory: Consumer rights and responsibilities related to food adulteration • Consumer education, Consumer's problems rights and responsibilities, • COPRA 2019 • Offenses and penalties Procedures to Complain- Compensation to Victims. Practical: Case studies on food safety and consumer rights.	8	**CO4**
5	**Food Additives**	Theory: Adulteration through FoodAdditives- Food colors, flavor enhancers, antimicrobial agents, curing and pickling agents, enzymes, neutralizing agents, stabilizing agents. Concept of sanitation and hygienic production of food. Practical: Adulteration through food additives.	8	**CO5**

Reference Books:

1. A first cource in food analysis- A. Y. Sathe, New Age International (P) Ltd., 1999
2. FoodSafety, casestudies- Ramesh. V. Bhat, NIN. 1992
3. Http://old.fssai.gov.in/portals/o/pdf/Draft Manuals/Beverages and confectionary.pdf
4. Http://cbseportal.com/project/Download- CBSE=XII-Chemistry-project-food-

e-Learning Source:

https://indianlegalsolution.com/laws-on-food-adulteration/ https://fssai.gov.in/dart/
https://byjus.com/biology/food-adulteration/

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)												
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	-	-	-	2	2	3	2	3	3	2	2		
CO2	-	-	-	3	2	3	2	3	3	2	2		
CO3	-	-	-	3	3	2	3	3	-	-	2		
CO4	-	-	3	3	3	3	3	3	3	2	3		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD

Effective from Session: 2024-25							
Course Code	Z020201T/NS110	**Title of the Course**	First Aid and Health	**L**	**T**	**P**	**C**
Year	First	**Semester**	Second	2	0	0	2
Pre-Requisite	10+2	**Co-requisite**	-				
Course Objectives	This course aims to educate fundamental and essential understanding of first aid and sex education.						

Course Outcomes	
CO1	Learn the skill needed to assess the ill or injured person and learn the skills to provide CPR to infants, children and adults.
CO2	Learn the skills to handle emergency child birth and learn the Basic sex education help young people navigate thorny questions responsibly andwith confidence.
CO3	Learn the Basic sex education help youth to understand Sex is normal. It's a deep, powerful instinct at the core of our survival as a species. Sexual desire is a healthy drive.
CO4	Help to understand natural changes of adolescence
CO5	Learn the skill to identify Mental Health status and Psychological First Aid

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Fundamentals of First Aid-I	A. Basic First Aid • Aims of first aid & First aid and the law. • Dealing with an emergency, Resuscitation (basic CPR). • Recovery position, Initial top to toe assessment. • Hand washing and Hygiene • Types and Content of a First aid Kit B. First AID Technique • Dressings and Bandages. • Fast evacuation techniques (single rescuer). • Transport techniques. C. First aid related with respiratory system • Basics of Respiration • No breathing or difficult breathing, Drowning, Choking, Strangulation andhanging, • Swelling within the throat, Suffocation by smoke or gases and Asthma. D. First aid related with Heart, Blood and Circulation • Basics of The heart and the blood circulation. • Chest discomfort, bleeding. E. First aid related with Wounds and Injuries • Type of wounds, Small cuts and abrasions • Head, Chest, Abdominal injuries • Amputation, Crush injuries, Shock F. First aid related with Bones, Joints Muscle related injuries • Basics of The skeleton, Joints and Muscles. • Fractures (injuries to bones).	8	1,2
2	Fundamentals of First Aid-II	G. First aid related with Nervous system and Unconsciousness • Basics of the nervous system. • Unconsciousness, Stroke, Fits – convulsions – seizures, Epilepsy. H. First aid related with Gastrointestinal Tract • Basics of The gastrointestinal system. • Diarrhea, Food poisoning. I. First aid related with Skin, Burns • Basics of The skin. • Burn wounds, Dry burns and scalds (burns from fire, heat and steam). • Electrical and Chemical burns, Sun burns, heat exhaustion and heatstroke. • Frost bites (cold burns), Prevention of burns, Fever and Hypothermia. J. First aid related with Poisoning • Poisoning by swallowing, Gases, Injection, Skin K. First aid related with Bites and Stings • Animal bites, Snake bites, Insect stings and bites L. First aid related with Sense organs • Basic of Sense organ. • Foreign objects in the eye, ear, nose or skin. • Swallowed foreign objects. M. Specific emergency satiation and disaster management • Emergencies at educational institutes and work • Road and traffic accidents. • Emergencies in rural areas. • Disasters and multiple casualty accidents. • Triage. • Emergency Child birth	8	2.3

	Fundamentals of Sex Education-I	Basic Sex Education • Overview, ground rules, and a pre-test • Basics of Urinary system and Reproductive system. • Male puberty — physical and emotional changes • Female puberty — physical and emotional changes • Male-female similarities and differences • Sexual intercourse, pregnancy, and childbirth • Facts, attitudes, and myths about LGBTQ+ issues and identities • Birth control and abortion • Sex without love — harassment, sexual abuse, and rape • Prevention of sexually transmitted diseases	7	4
4	Fundamentals of Sex Education-II	• Mental Health and Psychological First Aid • What is Mental Health First Aid? • Mental Health Problems in the India • The Mental Health First Aid Action Plan • Understanding Depression and Anxiety Disorders • Crisis First Aid for Suicidal Behavior & Depressive symptoms • What is Non-Suicidal Self-Injury? • Non-crisis First Aid for Depression and Anxiety • Crisis First Aid for Panic Attacks, Traumatic events • Understanding Disorders in Which Psychosis may Occur • Crisis First Aid for Acute Psychosis	7	5

Reference Books:
Indian First Aid Mannual-https://www.indianredcross.org/publications/FA-manual.pdf
Red Cross First Aid/CPR/AED Instructor Manual
https://mhfa.com.au/courses/public/types/youthedition4
Finkelhor, D. (2009). The prevention of childhood sexual abuse. Durham, NH: Crimes Against Children Research Center.
Orenstein, P. (2016). Girls and sex: Navigating the complicated new landscape. New York, NY: Harper.
e-Learning Source:
https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online
www.unh.edu/ccrc/pdf/CV192. pdf
https://www.firstaidforfree.com/
https://www.coursera.org/learn/psychological-first-aid
https://www.coursera.org/learn/mental-health

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)											
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	-	-	-	-	2	-	-	2	1
CO2	1	3	-	-	-	-	-	2	-	-	3	3
CO3	2	3	-	-	-	-	-	3	-	-	2	2
CO4	3	2	-	-	-	-	-	1	-	-	3	3
CO5	3	3	-	-	-	-	-	3	-	-	2	3

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2024-25							
Course Code	B100208T/ BS116	**Title of the Course**	Artificial Intelligence in Biological Sciences	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	**0**	**0**	**0**	**0**
Pre-Requisite	10+2 Biology	**Co-requisite**					
Course Objectives	The curriculum aims to equip biological sciences students with the essential knowledge and skills to leverage artificial intelligence for innovative research and applications in their field.						

Course Outcomes	
CO1	The students will be able to explain components, scope and ethical consideration in AI.
CO2	The students will be able to explain basics of machine learning.
CO3	The students will be able to collect, clean, analyze sequences, predict protein structure, and network analysis in system biology.
CO4	The students will be able to carry out biodiversity modelling and text mining for literature review.
CO5	The students will be able to explain use of AI in drug discovery

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
UNIT 1	**Introduction to artificial intelligence**	History and evolution of AI, comparison of human and computer skills, Components of AI, scope and significance, applications, limitations and implications in different domains, Ethical considerations in AI development and deployment, Intelligent Agent, logical agent. **Problem-solving through AI:** Defining the problem as a state space search, analysing the problem, solving the problem by searching, informed search, and uninformed Search	**8**	**CO1**
UNIT 2	**Machine Learning Basics**	Neural networks and deep learning, Supervised and unsupervised learning, feature selection and engineering, learning from observation, and knowledge in learning. **Natural Language Processing:** Brief history of NLP, Text processing, Sentiment analysis, language translation, Early NLP system, ELIZA system, LUNAR system, General NLP system.	**8**	**CO2**
UNIT 3	**AI Techniques in Systems Biology**	Computational Biology and Bioinformatics: Introduction to bioinformatics tools and databases, Sequence analysis and protein structure prediction, Predictive modelling for gene expression, Network analysis in systems biology. Data collection and cleaning for biological datasets, Exploratory data analysis, Statistical tools for data interpretation.	**8**	**CO3**
UNIT 4	**Data Science for Biologists**	AI for Ecological Modelling: Environmental data analysis and modeling, Biodiversity monitoring using AI, Conservation strategies with machine learning. Text mining for literature review in life sciences, and Automated annotation of biological texts. Personalized medicine and genetic diagnostics, AI in Drug Discovery: Virtual screening using machine learning, Predictive modeling for drug interactions, Optimization algorithms in drug design.	**8**	**CO4,5**

Reference Books:

1. Ghosh, Z. and Mallick, B. (2008). Bioinformatics: Principles and Applications. Oxford University Press.
2. Lesk M. Arthur (2014). Introduction to Bioinformatics. Oxford University Press
3. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition, Wiley Blackwell.
4. Artificial Intelligence and Molecular Biology (Lawrence E. Hunter)

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1					1	3	3	2	1
CO2	3	1					2	3	3	2	1
CO3	3	1					1	3	3	2	1
CO4	3	1					1	3	3	2	1
CO5	3	1					1	3	3	2	1

2- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**