Integral University, Lucknow

Effective from Session: 2022-23							
Course Code	B100101T /BS103	**Title of the Course**	Introduction to Cell Biology and Genetics	**L**	**T**	**P**	**C**
Year	1	**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	Students will be able to know the historical perspective of cell discovery, differences between Prokaryotic and Eukaryotic cells, as well as animal and plant cells.
CO2	Students will be able to develop an understanding about structure and functions of different cell organelles including cytoskeleton and its role in cell motility.
CO3	Students will be able to develop an understanding of different types of cell division, transport across cell membrane, cell-cell communication, signal transduction and cell death.
CO4	Students will be able to develop an understanding about structure and function of chromosomes, chromosomal aberrations, Mendelian genetics, variations from mendelian genetics, mechanism of linkage and significance of crossing over.
CO5	Students will be able to develop an understanding of the process of gene mutations (types and economic importance), Human genetics and inherited diseases, 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 ofLiving Systems**	Discovery of cell, The Cell theory Ultrastructure of a eukaryotic cell – (both plant and animal cell).	6	**CO1**
2	**Cell organelles and cytoskeleton**	Structure and functions of cell organelles, Cytoskeletal structures (Microtubules, Microfilaments); cell motility.	8	**CO2**
3	**Cell Division and Membrane Transport**	Cell cycle, mitosis and meiosis, Membrane transport: active and passive transport.	8	**CO3**
4	**Cell signaling & CellDeath**	Introduction to signal transduction and its molecular mechanism, cell senescence, Programmed Cell Death.	6	**CO3**
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	**CO4**
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	**CO4**
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	**CO5**
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	**CO5**

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:

www.coursera.com

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**

Integral University, Lucknow

Effective from Session: 2022-23							
Course Code	B100103P /BS105	**Title of the Course**	Introduction to Cell Biology & Genetics Lab	**L**	**T**	**P**	**C**
Year	**1**	**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**

Integral University, Lucknow

Effective from Session:							
Course Code	B110101T / BS142	**Title of the Course**	Fundamentals of Biochemistry	**L**	**T**	**P**	**C**
Year	1	**Semester**	I	**3**	**1**	**0**	**4**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	**The objective of this course is to develop an understanding of basics of biomolecules.**						

CourseOutcomes	
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 acid structure.	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)

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

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		3	2
CO2	3	1					1	3		3	2
CO3	3	1					1	3		3	2
CO4	3	1					1	3		3	2
CO5	3	1					1	3			

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

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

Integral University, Lucknow

Effective from Session:							
Course Code	B110102P /BS143	**Title of the Course**	ANALYTICAL BIOCHEMISTRY LAB	**L**	**T**	**P**	**C**
Year	1	**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 -01**	Qualitative test for carbohydrates (Molisch test, Benedict test, Fehling test, Bradford and Iodine tests).	6	**CO1**
2	**Exp -02**	Estimation of vitamin C and Determination of pK A of glycine.	6	**CO2**
3	**Exp -03**	Perform spot test for amino acids in a given sample.	6	**CO3**
4	**Exp -04**	Estimate cholesterol in a given sample.	6	**CO4**
5	**Exp -05**	Perform DNA and RNA estimation in a given sample.	6	**CO5**

Reference Books:

B**ooks recommended:** Boyer RF. (2012) Biochemistry laboratory: modern theory and techniques (2nd Edition). Pearson Education, 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	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**

Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	B150101T/ES125	**Title of the Course**	Basics of Environmental Science	**L**	**T**	**P**	**C**
Year	1	**Semester**	I	**3**	**1**	**0**	**4**
Pre-Requisite	10+2 with Physics, Chemistry & (Maths/ Biology)	**Co-requisite**					
Course Objectives	This course provides students with a working knowledge of concept of environment and the relation between human and its relation with the environment.						

Course Outcomes	
CO1	Gain knowledge about origin of life and related theories.
CO2	Learn fundamental concept of environmental science.
CO3	Develop the understanding about environmental education and able to understand the relationship between human and environment.
CO4	Understand the concept of sustainable development and SDG and also able to understand the current scenario of environmental degradation.
CO5	Learn the significance and importance of environmental management and have the practical knowledge about the affected areas of environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Evolution**	Origin of life and speciation, Darwinism and modern synthetic theory of evolution, Natural Selection; Biochemical basis of origin of life; Hardy Weinberg Equilibrium; Genetic drift.	8	**CO1**
2	**Concept of Environment**	Definition, Principles and Scope of Environmental Science; Environment, its components and segments; Moral and Aesthetic Nature of Environmental Science; Objectives and Historic roots of the subject; for Public Awareness.	8	**CO2**
3	**Environmental**	Goals of environmental education; Environmental Literacy, Environmental Careers, Environmental Justice, Individual Organisms, Environmentalism, Environmental Education at Primary, Secondary level.	6	**CO3**
4	**Man and Environment:**	Man-Environment relationships; Impacts of human activity on environment (Agriculture, transportation, mining, urbanization, industrialization); Environmental Degradation and Conservation Issues, Modern concept of environmental conservation	8	**CO3**
5	**Sustainable development**	Concept and Significance of sustainable development, Core elements of sustainable development, Over-view of SDG (Sustainable Development Goals).	6	**CO4**
6	**Current Environmental Issues**	Ill effects of fireworks and environmental degradation, Climate change and its effects on human health, Deforestation and its impacts on human communities and flora and fauna of the Environment.	8	**CO4**
7	**Environmental Management**	Significance of Environment Management, Resettlement and rehabilitation of project affected areas, Environmental ethics: Role of Indian's religions and cultures in environmental conservation, Communication and public awareness programmes for environment management.	8	**CO5**
8	**Field Survey**	Assessment of impacts of anthropogenic activities in the surrounding environment; Evaluation of the consequences rising from agricultural and commercial logging practices to preserve environment, case study, Reclamation and monitoring of the affected area by developmental activities: case study.	8	**CO5**

Reference Books:

1. Environmental Science by William P. Cunningham and Mary Ann Cunningham; McGraw-Hill Publications.

2. Environmental Science: Earth as a Living Planet by Botkin and Keller; JOHN WILEY & SONS, INC

3. A text Book of Environment Studies, Asthana, D. K. and Asthana, M. 2006, S. Chand & Co.

4. Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p

5. Atmosphere, Weather and Climate, Barry, R. G. 2003, Routledge Press, UK.

6. Environmental Science: S. C. Santra, New Central Book Agency.

e-Learning Source:

1. Environmental Science, Dr. Y. K. Singh, https://www.hzu.edu.in/bed/E%20V%20S.pdf
2. Textbook for Environmental Studies, Erach Bharucha, https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf
3. Fundamentals of Environmental Studies, https://www.jkcprl.ac.in/download/11567250727.pdf

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2											2	2				
CO2	3	3											3	2				
CO3	2	2											2	3				
CO4	3	3											2	2				
CO5	2	1											3	2				

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

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

Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	B150102P/ES127	**Title of the Course**	Practical on Environment	**L**	**T**	**P**	**C**
Year	1	**Semester**	I	**0**	**0**	**4**	**2**
Pre-Requisite	10+2 with Physics, Chemistry & (Maths/ Biology)	**Co-requisite**					
Course Objectives	This course provides students with a working knowledge of Lab practices, environment and its relation with the human being, Meteorological parameters.						

Course Outcomes	
CO1	Students will be able to understand the good Laboratory Practices including Dos & DON'Ts in the laboratory.
CO2	Students will be able to learn interaction of human with environment.
CO3	Students develop understanding about local environmental problems and able to find remedy.
CO4	Gain knowledge about different meteorological parameters.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Good Lab Practices (GLP).**	i. Instructions, ii. DO's and DONT's in the Laboratory, iii.General Information, iv. Introduction	8	**CO1**
2	**Environmental Issues and Impacts**	Study the effects of environmental problem and its impact on human population.	8	**CO2**
3	**Plants/ Trees and Its Importance**	Choose five common species of Trees / plants from your near areas and list their common names.Describe each plant in terms of its height and leaves	8	**CO3**
4	**Weather Parameters measuring Devices**	To record the following parameters of weather monitoring station: A. Atmospheric Pressure, B. Rainfall, C. Outdoor, indoor temperature, D.Wind speed and Direction, E. Humidity & draw point	8	**CO4**

Reference Books:

Environmental Science: Earth as a Living Planet by Botkin and Keller; JOHN WILEY & SONS, INC.

A text Book of Environment Studies, Asthana, D. K. and Asthana, M. 2006, S. Chand & Co.

Atmosphere, Weather and Climate, Barry, R. G. 2003, Routledge Press, UK.

Environmental Science: S. C. Santra, New Central Book Agency.

e-Learning Source:

1. Good Lab Practices, https://youtu.be/YXl6MLvcGic; https://youtu.be/TADfGsai3Ro.

2.Indian Meteorological Department, Weather, https://mausam.imd.gov.in/imd_latest/weather_video/video.php.

3, *Atmospheric Pressure, https://youtu.be/r7ZfzJ-yP3U; https://youtu.be/JQp63iUYSgU.*

4. *Anemometer, https://youtu.be/cWzGDEDVEgY; https://youtu.be/J5Eh6EU18Us;https://youtu.be/n5deIWQigrk.*

5. Rain gauge, https://youtu.be/y6tyAy_MRv0; https://youtu.be/IU9CsbAkRbc.

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2											2	3				
CO2	2	2											3	2				
CO3	3	2											2	2				
CO4	2	2											2	2				
CO5																		

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

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

Integral University, Lucknow

Effective from Session:							
Course Code	B110101/ BSVII	**Title of the Course**	BIOMOLECULES AND NUTRITION	**L**	**T**	**P**	**C**
Year	1	**Semester**	I	**1**	**0**	**2**	**3**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	**The objective of this course is to develop an understanding of basics of Biomolecules structure and function, role of nutrients in human health.**						

Course Outcomes	
CO1	Develop an understanding of General properties, Classification and Nomenclature.
CO2	Develop an understanding about importance of food and nutrition.
CO3	Develop an understanding of macronutrients.
CO4	Develop an understanding about micronutrients.
CO5	Develop an understanding of nutritional deficiency diseases.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Biomolecules general aspects**	Biomolecules general aspects: carbohydrates, proteins, fats, vitamins, minerals, nucleic acids structure and its types.	9	**CO1**
2	**Overview of Food and Nutrition**	Overview of Food and Nutrition: Classification of food and nutrients, Importance of dietary fibers, Malnutrition, Food Commodities (Cereal millets, pulses, legumes, milk & milk products, meat, fish, poultry, fruits & vegetables, fats oils, sugar products, beverages.	9	**CO2**
3	**Role of macronutrients in nutrition:**	Role of macronutrients in nutrition: Physiological role of Macronutrients: Carbohydrate, Protein, Lipid, Nucleic acids.	9	**CO3**
4	**Role of micronutrients**	Role of micronutrients in nutrition: Biochemical and physiological role of Vitamins & Minerals, Bioavailability & Requirements.	9	**CO4**
5	**Nutritional Deficiency Diseases**	Nutritional Deficiency Diseases: excess and deficiency of vitamins. Source, deficiency and excess of trace elements such as calcium, sodium, potassium, phosphorus, iron, zinc, selenium, iodine, chromium	9	**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.

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

e-Learning Source:

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	PSO4	PSO5	PSO6	PSO7
CO1	3	1					1	2					
CO2	3	1					1	3					
CO3	3	1					1	3					
CO4	3	1					1	3					
CO5	3	1					1	3					

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

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

Integral University, Lucknow

Effective from Session:							
Course Code	Z010101T/ BE105	**Title of the Course**	Food, Nutrition, and Hygiene	**L**	**T**	**P**	**C**
Year	1	**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**

Integral University, Lucknow

Effective from Session: 2022-23							
Course Code	B100201T /BS115	**Title of the Course**	Human Physiology	**L**	**T**	**P**	**C**
Year	1	**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. XI Edition .John wiley & sons,Inc.

	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**

Integral University, Lucknow

Effective from Session:							
Course Code	B100202P /BS152	**Title of the Course**	Human Physiology Lab	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**0**	**0**	**4**	**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	4	**CO1**
2	**Exp -02**	Determination of blood groups	6	**CO2**
3	**Exp -03**	Counting of mammalian RBCs	4	**CO3**
4	**Exp -04**	Determination of TLC and DLC	6	**CO4**
5	**Exp -05**	Demonstration of Haemoglobin	6	**CO5**
6	**Exp -06**	Demonstration of action of an enzyme	6	**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**

Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	B110203T /BS154	**Title of the Course**	Clinical Biochemistry	**L**	**T**	**P**	**C**
Year	1	**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 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, atheroscelorosis, 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 and counts**	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 related diseases**	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 aspartate transaminase, isoenzymes of creatine kinase and troponin.	8	**CO5**
7	**Renal function test**	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.

Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. JohnWiley-Liss Inc. Publication.
Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
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	PSO6	PSO7
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**

Integral University, Lucknow

Effective from Session:							
Course Code	B110204P /BS155	**Title of the Course**	CLINICAL BIOCHEMISTRY LAB	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**0**	**0**	**4**	**2**
Pre-Requisite	**10+2**	**Co-requisite**					
Course Objectives	**This course is designed to develop the understanding of the basic knowledge of Anticoagulants, Glucose Tolerance Specific Gravity of Urine and about activity of Aspartate transaminase**						

Course Outcomes	
CO1	Understand the basics of Anticoagulation analysis
CO2	Understand about Glucose Tolerance Test
CO3	Have knowledge about Tests for determination of Proteins in Urine
CO4	Perform and estimate the Specific Gravity of Urine
CO5	Perform and estimate the activity of Aspartate transaminase

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Exp -01**	Analysis of Anticoagulation of Blood.	6	**CO1**
2	**Exp -02**	Determination of blood glucose by Oral Glucose Tolerance Test	6	**CO2**
3	**Exp -03**	Determination of proteins in urine	6	**CO3**
4	**Exp -04**	Determination of specific gravity of urine	6	**CO4**
5	**Exp -05**	Estimation of activity of Aspartate transaminase	6	**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.

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	3		3			
CO2	3						3	3		3			
CO3	3						3	3		3			
CO4	3						3	3		3			
CO5	3						3	3		3			

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

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

Integral University, Lucknow

Effective from Session:							
Course Code	B110201T /BS151	**Title of the Course**	Basic Microbiology and Bio-safety	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**3**	**1**	**0**	**4**
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 microbes in extreme environments and microbial interactions.
CO4	Know the basics of recombination in prokaryotes and pathogenesis of microorganisms, control of microorganisms.
CO5	Discuss bio-safety measures.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**History and classification of microbiology**	Pasteur's experiments, various forms of microorganisms (bacteria, fungi, viruses, protozoa, PPLOs); nutritional classification of microorganisms; nature of the microbial cell surface, gram positive and gram negative bacteria; growth curve.	8	**CO1**
2	**Structure of bacterial cell**	Capsule and slime, flagella, cell wall, cell membrane, chromosome, plasmid and endospore, gram positive and gram-negative bacteria; growth curve.	8	**CO2**
3	**Microbes in extreme environments and interactions**	Thermophiles, alkalophiles, acidophiles and symbiosis. Antibiosis among microbial population, N_2 fixing microbes in agriculture and forestry.	6	**CO3**
4	**Control of microorganisms**	Physical agents (autoclave, hot airoven, laminar air flow and membrane filter), chemical agents (Alcohol, Halogens and Gaseous agents, antibiotics), radiation methods (UV rays).	8	**CO4**
5	**Bacteriophage and staining**	Bacteriophage and staining, some common pathogenic microorganisms, bacterial gall, viral: TMV, fungal: red rot of sugar cane.	8	**CO1**
6	**Recombination in prokaryotes**	Transformation, conjugation and transduction. Bacteriophage: lytic and lysogenic cycle.	8	**CO4**
7	**Stains and staining techniques**	Principles of staining, simple staining, negative staining, differential staining, gram and acid-fast staining, flagella staining, capsule and endospore staining.	6	**CO1**
8	**Bio-safety measures**	Historical backround; 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.	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.

SrilakshmiB (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	PSO4	PSO5	PSO6	PSO7
CO1	3	1				3	1			3			
CO2	3	1				3	1			3			
CO3	3	1				3	1			3			
CO4	3	1				3	1			3			
CO5	3	1				3	1			3			

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

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

Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	B110202P /BS153	**Title of the Course**	Microbial Techniques and Bio-safety Lab	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**0**	**0**	**4**	**2**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	**After completion of the course, a student will be able to develop the understanding of basic microbiology, Instruments used to study and work on microbes, Staining Techniques, Enzyme assay and Biochemical tests– starch hydrolysis, gelatin liquefaction, Cleaning and sterilization of glassware, Media preparation and Isolation of bacteria and fungi from various sources, Growth curve of bacteria, Isolation and purification.**						

Course Outcomes	
CO1	Develop an understanding of Instruments: Compound microscope, Autoclave, Hot air oven, pH meter, Laminar airflow, centrifuge, cleaning and sterilization of glass ware and staining techniques as Simple, Negative staining, Gram staining Endospore staining fungal staining.
CO2	Understand the growth pattern of bacteria and processes involved in culturing of microbes and media preparation.
CO3	Isolation of bacteria and fungi from soil/ air/water/ other sources and check effect of dyes, phenolic compounds and chemotherapeutic agents (disc inhibition method).
CO4	Have knowledge of enzyme assay and Biochemical tests–starch hydrolysis, gelatin liquefaction.
CO5	Have clear understanding of processes involved in Isolation and purification of DNA and RNA.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Exp-01**	Study of instruments: Compound microscope, Autoclave, Hot air oven, pH meter, Laminar airflow and centrifuge	2	**CO1**
2	**Exp-02**	Cleaning and sterilization of glass ware.	2	**CO1**
3	**Exp-03**	Media preparation: Nutrients agar, Nutrient broth and LB.	3	**CO1**
4	**Exp-04**	Isolation of bacteria and fungi from soil/ air/water – dilution and pour plate methods	3	**CO2**
5	**Exp-05**	Staining Techniques: Simple, Negative staining, Gram staining, Endospore staining, fungal staining.	3	**CO2**
6	**Exp-06**	Growth curve of bacteria.	3	**CO2**
7	**Exp-07**	Biochemical tests–starch hydrolysis, gelatin liquefaction	3	**CO4**
8	**Exp-08**	Study of Rhizobium from root nodules of legumes.	3	**CO3**
9	**Exp-09**	Isolation and purification of genomic DNA and RNA	3	**CO5**
10	**Exp-10**	Effect of dyes, phenolic compounds and chemotherapeutic agents (disc inhibition method)	3	**CO3**

Reference Books:

Introduction to Microbiology, Ingraham, 2ed.

Brock Biology of Microorganisms, Madigan et al, 9th ed.

Principles of Microbiology, R.M. Atlas, Wm C. Brown Publisher.

The Microbial World, Roger Y. Stanier, Prentice Hall

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	PSO5	PSO7
CO1	3	3	1	2		3		3	2	3			
CO2	3	3	1			3		3	2	3			

CO3	3	3	1			3		3	2				
CO4	3	3	1			3		3	2				
CO5	3	3	1	2		3		3	2				

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

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

Integral University, Lucknow

Effective from Session: 2022							
Course Code	A040209- LN109	**Title of the Course**	Basic of Communication	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**3**	**1**	**0**	**4**
Pre-Requisite		**Co-requisite**					
Course Objectives	To enhance basic communication skill among the students. Students will also learn about the fundamentals of linguistics and Grammars.						

Course Outcomes	
CO1	Basic understanding of Communication and professional communication
CO2	Basic knowledge of structural and functional Grammar. Learning language through literature.
CO3	Basic tools of communication and improvement in communicative competence.
CO4	Understanding the basic grammar and basic structure of language.
CO5	Students will gain a fundamental understanding of the nature, branches, and history of Linguistics.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Professional Communication**	Professional Communication: Its Meaning and Importance, Essentials of Effective Communication, Barriers to Effective Communication.	8	**CO1**
2	**Language through Literature**	A. Essays: 1. The Effect of Scientific Temper on Man by Bertrand Russell, 2. The Aim of Science and Humanities by Moody E Prior. B. 1. The Meeting Pool by Ruskin Bond, 2. The Portrait of a Lady by Khushwant Singh	8	**CO2**
3	**Basic Vocabulary**	Euphemism, One-word Substitution, Synonyms, Antonyms, Homophones, Idioms and Phrases, Common Mistakes, Confusable Words and Expressions.	8	**CO3**
4	**Basic Grammar**	Articles, Prepositions, Tenses, Concord, (Subject-Verb agreement), Modal Auxiliaries, Verbs: its Kinds and uses, Degrees of Comparison, Punctuation	8	**CO4**
5	**Language and Linguistics**	Language: Definition, characteristics and importance of Language Linguistics: Definition, nature, scope, branches, levels and types of Linguistics, Linguistics versus Traditional Grammar.	8	**CO5**

Reference Books:
Effective Communication Skills
Improve Your Communication Skills
Communication Skills Training
e-Learning Source:
www.ignou.com
www.swayam.com
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	PSO5
CO1	3	3	2	3	3	-	-	2	3	3	2	-
CO2	2	3	1	2	3	-	-	2	3	3	1	-
CO3	1	3	1	2	3	-	-	3	3	2	2	-
CO4	3	3	2	2	3	-	-	2	2	3	1	-
CO5	2	3	2	3	3	-	-	3	3	2	3	-

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

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

Integral University, Lucknow

Effective from Session: 2022							
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	**CO1**
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	**CO1**
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	**CO2**
4	Univariate Statistics	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	**CO3**
5	Bivariate Statistics	Covariance, correlations, scatter diagram, Karl Pearson's coefficient of correlation, Spearman's coefficient of rank correlation, regression and its coefficient, estimation of regression lines by the method of least square	7	**CO3**
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	**CO4**
7	Probability theory	Random experiment and associated sample space, events, definition of probability, algebra of events, addition and multiplication theorems on probability (without proof), conditional probability, Baye's theorem	8	**CO5**
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	**CO5**

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**

Integral University, Lucknow

Effective from Session:							
Course Code	I100205V/BS381	**Title of the Course**	Food Adulteration	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	**2**	**0**	**0**	**2**
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 types of food additives and adulteration and their effect on health
CO2	Describe common food additives and adulteration
CO3	To Understand laws related to food adulteration
CO4	To Understand consumer rights and responsibilities related to food adulteration

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Common Foods and Adulteration**	Common Foods subjected to adulteration- adulteration- Definition- Types; Poisonous substances, Foreign matter, Cheap substitutes, Spoiled parts. Adulteration through Food Additives- International and incidental. General Impact on Human Health.	8	**CO1**
2	**Adulteration of Common Foods and Methods of Detection**	Means of Adulteration Methods of Detection Adulteration in the following. Foods, Oil, Grain, Sugar Additives and Sweetening agents.	7	**CO2**
3	**Present Laws and Procedures on Adulteration**	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 suchas, A gmark, I.S.I. Quality control laboratories of companies, Private testing laboratory, Quality control laboratories of consumerco-operatives.	8	**CO3**
4	**Consumer rights**	Consumer rights and responsibilities related to food adulteration ● Consumer education, Consumer's problems rights and responsibilities, ● COPRA 2019 ● Offenses and panalties Procedures to Complain- Compensation to Victims.	7	**CO4**

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**

Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	Z020201/NS110	**Title of the Course**	First Aid and Health	**L**	**T**	**P**	**C**
Year	1	**Semester**	II	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 and with 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	**CO 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	**CO 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	**CO4**
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	**CO5**

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**