



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.

UnitNo	Title of the Unit	Content of Unit	ContactHrs.	MappedCO
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	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 and Cell Death	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:

<https://www.khanacademy.org/>

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1					1	3	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
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Integral University, Lucknow

Effective from Session: 2022-23

Course Code	B100102T /BS104	Title of the Course	Biochemistry and Metabolism	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, metabolism and enzymes.						

Course Outcomes

CO1	To understand basic details of carbohydrate molecules, its classification and carbohydrate metabolism.
CO2	To understand basic details of amino acid; protein molecules, its classification and protein metabolism.
CO3	To understand basic details of lipid molecules and its classification.
CO4	To understand basic details of nucleic acid molecules, its classification and nucleic acid metabolism.
CO5	To understand basic details of enzymes, its classification and enzyme kinetics.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Carbohydrates	Structure, classification and properties of Monosaccharides, Disaccharides, and Polysaccharides (starch, glycogen, peptidoglycan, cellulose).	8	CO1
2	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
3	Lipids and its metabolism	Structure, function, classification and properties of Fatty acids. degradation of fatty acids: oxidation; Ketone bodies, acidosis, ketosis, cholesterol synthesis	8	CO3
4	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.	6	CO4
5	Enzymes	Classification, properties and factors influencing enzyme activity, coenzymes, prosthetic group and co-factors, Lock & key hypothesis, induced fit hypothesis, Enzyme kinetics: Michaelis Menten equation, Lineweaver-Burk plot, Enzyme inhibition, Allosteric enzymes.	6	CO5
6	Carbohydrate metabolism	Glycolysis, TCA cycle, Electron Transport Chain and Oxidative phosphorylation, Gluconeogenesis and Glycogen metabolism.	8	CO1
7	Protein metabolism	Urea Cycle, transport of ammonia, deamination and transamination reactions. Inborn errors of protein metabolism.	8	CO2
8	Nucleic acid metabolism	Purine and Pyrimidine biosynthesis and degradation.	8	CO4

Reference Books:

- Lehninger, AL "Principles of Biochemistry"
- Lubert Stryer "Biochemistry"
- Voet & Voet "Biochemistry"
- Robert K., M Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Appleton & Lange, Robert K. Murray "Harper's Biochemistry"

e-Learning Source:

- <https://www.khanacademy.org/>
- www.coursera.com

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

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)											
	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		3	2	

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

Name & Sign of Program Coordinator	Sign & Seal of HoD
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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	2	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	Course Articulation Matrix: (Mapping of COs with POs and PSOs)										
	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
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Integral University, Lucknow

Effective from Session: 2022-23

Course Code	B100104P /BS106	Title of the Course	Basic Biochemistry Lab	L	T	P	C
Year	1	Semester	I	0	0	2	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 pKa 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, Barfoed and Iodine tests)	6	CO1
2	Exp 2	Estimation of vitamin C and Determination of pKa 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:

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>

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				3
CO5	3	1		3	3	3	1				3

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

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	B150101T/ES125	Title of the Course	Basics of Environmental Science	L	T	P	
Year	1	Semester	I	3	1	0	4
Pre-Requisite	10+2 with Physics, Chemistry & (Maths/ Biology)						
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	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO																		
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
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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. DOs and DON'Ts 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/YX16MLvcGic>; <https://youtu.be/TADfG sai3Ro>.

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
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Integral University, Lucknow

Effective from Session: 2020-21

Course Code	B100107I/BS107	Title of the Course	Enzymology	L	T	P	C
Year	1	Semester	I	1	0	2	3
Pre-Requisite	10+2 with Biology	Co-requisite					
Course Objectives	This course has been designed to teach the student majoring in science all the major aspects of the study of enzymes. The course focuses on the theories of enzyme kinetics, the mechanisms of enzyme catalysis, and immobilization of enzyme.						

Course Outcomes

CO1	To Understand general properties, Classification and nomenclature of enzymes.
CO2	To Understand enzyme kinetics and Enzyme substrate complex.
CO3	To Understand enzyme Inhibition and Inhibitors.
CO4	To Understand multisubstrate enzyme kinetics.
CO5	To Understand enzyme Technology and Application enzyme in health and industry.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	General properties, Classification and nomenclature of enzymes	General properties of enzymes, Classification of enzymes and factors influencing enzyme activity, co-enzymes, prosthetic group and co-factors, binding site, active site, activation and free energies, specificity of enzymes, Lock & key hypothesis, induced fit hypothesis, Regulation of enzyme activity.	9	CO-1
2	Enzyme kinetics	Enzyme substrate complex, concept of E-S complex, Kinetics of enzyme activity, Michaelis-Menten equation and its derivation, Different plots for the determination of Km and Vmax and their physiological significance.	9	CO-2
3	Enzyme Inhibition	Enzyme inhibition, Types of reversible inhibitors, inhibitor constant (Ki), suicide inhibitor, applications of enzyme inhibition, Feedback inhibition, allosteric concept, Isoenzyme.	9	CO-3
4	Multi substrate enzyme kinetics	Two substrate reactions, sequential and ping pong pathways, forms of initial rate equations for random, ordered and ping pong pathways and their primary and secondary plots.	9	CO-4
5	Enzyme Technology	Methods for large scale production of enzymes. Immobilized enzyme and their comparison with soluble enzymes, Methods for immobilization of enzymes. Immobilized enzyme reactors. Application of Immobilized and soluble enzyme in health and industry.	9	CO-5

Reference Books:

1. Lehninger, AL "Principles of Biochemistry"
2. Lubert Stryer "Biochemistry"
3. Voet & Voet "Biochemistry"
4. Alan Fersht "Enzyme Structure and Mechanism"
5. Alan Fersht "Enzyme Structure and Mechanism"
6. Trevor Palmer "Enzymology"

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					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		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:							
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 micronutrients and their 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 and Micro 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-nutrition> Diploma 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
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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, Haemopoiesis, 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, saltatory 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. Herculourt Asia PTE Ltd. /W.B. Saunders Company.

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

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	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			

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

<p>Name & Sign of Program Coordinator</p>	<p>Sign & Seal of HoD</p>
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Integral University, Lucknow

Effective from Session: 2022-23

Course Code	B100203T/BS110	Title of the Course	Plant Structure and Physiology	L	T	P	C
Year	1	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 morphology and anatomy of plants, structure and functioning of plant tissues and physiology and growth in plants						

Course Outcomes

CO1	Students will be able to learn the structural organization of lower plants (Algae-Gymnosperms).
CO2	Students will be able to learn the morphology and anatomy of angiospermic plants.
CO3	Students will be able to understand plant water relations, uptake, transport and role of micro and macronutrients
CO4	Students will be able to understand the process of photosynthesis, carbon and nitrogen metabolism
CO5	Students will be able to understand the role of plant hormones, photoperiodism and vernalization in plant growth and development.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Map ped CO
1	Structural organization of lower plants	General characters and structural organization of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms	8	CO1
2	Structural organization of higher plants	Plant parts, Modifications of stems, leaves and roots, Flower: Parts, Functions, Floral whorls, Flower as a modified shoot, Fruits: Formation, Types, Parthenocarp, Seed: Structure, Formation	8	CO2
3	Plant Anatomy	Structure of plant cell, Types of plant cells: parenchyma, collenchyma and sclerenchyma, Plant tissues: xylem and phloem. Anatomy of dicot and monocot stems, leaves and roots, Secondary growth and annual rings	8	CO2
4	Plant water relations	Plant water relations: Importance of water to plant life, diffusion, osmosis, plasmolysis, imbibition, Ascent of sap transpiration, stomata & their mechanism of opening & closing, guttation	8	CO3
5	Micro & macro nutrients	Micro & macro nutrients: criteria for identification of essentiality of nutrients, roles and deficiency systems of nutrients, mechanism of uptake of nutrients, mechanism of food transport	6	CO3
6	Photosynthesis	Photosynthesis- Photosynthesis pigments, concept of two photo systems, photophosphorylation, Calvin cycle, CAM plants, photorespiration, compensation point	8	CO4
7	Nitrogen metabolism	Nitrogen metabolism- inorganic & molecular nitrogen fixation, nitrate reduction and ammonium assimilation in plants	6	CO4
8	Growth and development	Growth and development: Definition, phases of growth, growth curve, growth hormones (auxins, gibberlins, cytokinins, abscisic acid, ethylene), physiological role and mode of action. Seed dormancy and seed germination, concept of photoperiodism and vernalization, plant movements.	8	CO5

Reference Books:

1. Esau, K. 1977 Anatomy of Seed Plants. Wiley Publishers.
2. Fahn, A. 1974 Plant Anatomy. Pergmon Press, USA and UK.
3. Hopkins, W.G. and Huner, P.A. 2008 Introduction to Plant Physiology. John Wiley and Sons.
4. Mauseth, J.D. 1988 Plant Anatomy. The Benjamin/Cummings Publisher, USA.
5. Salisbury, F.B. and Ross, C.W. 1991 Plant Physiology, Wadsworth Publishing Co. Ltd.
6. Taiz, L. and Zeiger, E. 2006 Plant Physiology, 4 edition, Sinauer Associates Inc. MA, USA
7. Biology PH Raven & G.B Johnson
8. A textbook of Botany S.N Pandey, Vikas Publishing, India

e-Learning Source:

<https://www.classcentral.com/course/swayam-plant-groups-plant-diversity-95321>
https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/213

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

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

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session:							
Course Code	B100204P/ BS119	Title of the Course	Plant structure and 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 enable the students to develop the understanding of the basic morphology and anatomy of plants, structure and functioning of plant tissues and physiology and growth in plants						

Course Outcomes	
CO1	Get basic knowledge of the structure of algae, fungi, bryophyte, pteridophyte, gymnosperm
CO2	Gain knowledge about the structure of a flower and various types of inflorescence, seeds and fruit
CO3	Have basic knowledge of anatomy of dicots and monocots
CO4	To study the effect of two environmental factors (light and wind) on transpiration and effect of light intensity and bicarbonate concentration on O ₂ evolution in photosynthesis.
CO5	Determination of osmotic potential of plant cell sap by plasmolytic method.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Exp -01	Study of one example each of algae and fungi	4	CO1
2	Exp -02	Study of one example each of bryophyte, pteridophyte, and gymnosperm	4	CO1
3	Exp -03	Study of the morphology study of flower parts, inflorescence	6	CO2
4	Exp -04	Study of the morphology study of seed, fruit types	2	CO2
5	Exp -05	Transverse section of dicot and monocot roots, stem and leaves	8	CO3
6	Exp -06	To study the effect of two environmental factors (light and wind) on transpiration.	2	CO4
7	Exp -07	To study the effect of light intensity and bicarbonate concentration on O ₂ evolution in photosynthesis.	2	CO4
8	Exp -08	Determination of osmotic potential of plant cell sap by plasmolytic method.	2	CO5

Reference Books:	
1.	Salisbury, F.B. and Ross, C.W. 1991 Plant Physiology, Wadsworth Publishing Co. Ltd.
2.	Taiz, L. and Zeiger, E. 2006 Plant Physiology, 4 edition, Sinauer Associates Inc .MA, USA
3.	Biology PH Raven & G.B Johnson
4.	Biological science DJ Taylor NPO Green GW Stout
5.	A textbook of Botany S.N Pandey, Vikas Publishing, India
e-Learning Source:	
	https://www1.biologie.uni-hamburg.de/b-online/virtualplants/ipivp.html

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
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Integral University, Lucknow

Effective from Session: 2022-23							
Course Code	B100205T/BS117	Title of the Course	Animal and Plant Biotechnology	L	T	P	C
Year	1	Semester	II	3	1	0	4
Pre-Requisite	10+2 with Biology	Co-requisite					
Course Objectives	The course has been designed to make students aware of basic plant biotechnology techniques and their applications in plant growth and development, and large scale production of natural products from plant source. The course also imparts information on characteristics of primary & secondary cell culture, hybridoma technology & application of animal biotechnology.						

Course Outcomes	
CO1	Get proper knowledge about media preparation for In-vitro propagation of plants and aseptic techniques used.
CO2	The students will learn the role of techniques for haploid plant production and its significance.
CO3	Have basic knowledge of several technique of transformation: Agrobacterium-mediated and physical methods (Microprojectile bombardment and electroporation) and the biology growth promoting bacteria.
CO4	Understand the characteristics of Primary & Secondary cell cultures. Principle & application of Hybridoma technology
CO5	Have an understanding of various methods of gene delivery methods of Animals and the application of Animal biotechnology

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Aseptic Techniques	Aseptic Techniques, Nutrient media, and use of growth regulators (Auxins, Cytokinins and Gibberellins). Callus and suspension culture	8	CO-1
2	Haploid Plant Production	Microspore and ovule culture, Organ Culture and their applications, Somatic Embryogenesis: Techniques and applications. Protoplast Culture, somatic hybridization, methods of protoplast fusion: chemical and electro fusion, practical application of somatic hybridization	8	CO-2
3	Transgenic Plants & Transformation Techniques	Transgenic Plants & Technique of transformation: Agrobacterium-mediated and physical methods (Microprojectile bombardment and electroporation).	8	CO-3
4	Animal Tissue culture	Nutrient requirements of mammalian cells, Media for culturing cells, Growth supplements. Primary cultures & Secondary cultures	8	CO-4
5	Plant Growth Promoting Bacteria	Nitrogen fixation, Nitrogenase, Hydrogenase, Nodulation, Biocontrol of Pathogens and growth promotion by free- living bacteria.	8	CO-3
6	Hybridoma Technology	Principles and methods of hybridoma technology. Production and characterization of monoclonal antibodies and their application in animal health and production.	8	CO-4
7	Gene delivery methods for Animals	Viral vectors, Direct DNA transfer, Particle bombardment, Electroporation, Microinjection & Chemical methods.	8	CO-5
8	Application of Animal Biotechnology	Application of Animal biotechnology: Gene Therapy, Milk Production, Meat Production and Aquaculture Production.	8	CO-5

Reference Books:
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			2		3		3	
CO2	3	1			2		3		3		
CO3	3	1			2	2	3		3		
CO4	3	1					3	2	3		1
CO5	3	1		2	2		3				3

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

Name & Sign of Program Coordinator	Sign & Seal of HoD
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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	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	3	CO1
2	Exp -02	Determination of blood groups	3	CO2
3	Exp -03	Counting of mammalian RBCs	3	CO3
4	Exp -04	Determination of TLC and DLC	3	CO4
5	Exp -05	Demonstration of Haemoglobin	3	CO5
6	Exp -06	Demonstration of action of an enzyme	3	CO4

Reference Books:	
1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hecourt Asia PTE Ltd. /W.B. Saunders Company.	
2. FoxSI – Human Physiology, (1998): (McGrawHill,, ISBN:0071157069)	
3. Tortora ,G.J.& Grabowski, S.(2006). Principal of Anatomy & PhysioloHy. XI Edition. Johnwiley & sons, Inc.	
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	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		

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

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session:							
Course Code	B100206P /BS118	Title of the Course	Plant & Animal Biotechnology Lab	L	T	P	C
Year	1	Semester	II	0	0	2	2
Pre-Requisite	10+2	Co-requisite					
Course Objectives	The objective of this course is to develop the understanding about advanced techniques used in molecular biology and biotechnology and their application.						

Course Outcomes	
CO1	Preparation of plant culture media and its sterilization
CO2	In vitro germination of seeds.
CO3	Initiation and maintenance of Callus and suspension Culture
CO4	Isolation of genomic DNA from bacteria, plant and animal tissue
CO5	Agarose Gel Electrophoresis

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Exp 1	Preparation of plant culture media and its sterilization	6	CO1
2	Exp 2	In vitro germination of seeds.	6	CO2
3	Exp 3	Initiation and maintenance of Callus and suspension Culture	6	CO3
4	Exp 4	Isolation of genomic DNA from bacteria, plant and animal tissue	6	CO4
5	Exp 5	Agarose Gel Electrophoresis	6	CO5

Reference Books:	
Keith Wilson John Walker John M. Walker “Principles and Techniques of Practical Biochemistry”	
Chirikjian “Biotechnology Theory & Techniques”	
Joseph Sambrook David W. Russell Joe Sambrook “Molecular Cloning: A Laboratory Manual”	
William M., Ph.D. O’Leary Robert Dony Wu “Practical Handbook of Microbiology”	
Brown, TA “Gene cloning: An introduction	
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	PSO6	PSO7
CO1	3	1		3		3		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
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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	1
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	2
3	Basic Vocabulary	Euphemism, One-word Substitution, Synonyms, Antonyms, Homophones, Idioms and Phrases, Common Mistakes, Confusable Words and Expressions.	8	3
4	Basic Grammar	Articles, Prepositions, Tenses, Concord, (Subject-Verb agreement), Modal Auxiliaries, Verbs: its Kinds and uses, Degrees of Comparison, Punctuation	8	4
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	5

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
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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	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	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	3
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	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	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	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	Course Articulation Matrix: (Mapping of COs with POs and PSOs)											
	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
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Integral University, Lucknow

Effective from Session:							
Course Code	B100205I/ 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 such as, 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 <ul style="list-style-type: none"> ● 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 course 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](http://old.fssai.gov.in/portals/o/pdf/Draft%20Manuals/Beverages%20and%20confectionary.pdf)
4. [Http://cbseportal.com/project/Download- CBSE=XII-Chemistry-project-food-](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	POs							PSOs					
	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
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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 FirstAid-I	A. Basic First Aid <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Dressings and Bandages. • Fast evacuation techniques (single rescuer). • Transport techniques. C. First aid related with respiratory system <ul style="list-style-type: none"> • Basics of Respiration • No breathing or difficult breathing, Drowning, Choking, Strangulation and hanging, • Swelling within the throat, Suffocation by smoke or gases and Asthma. D. First aid related with Heart, Blood and Circulation <ul style="list-style-type: none"> • Basics of The heart and the blood circulation. • Chest discomfort, bleeding. E. First aid related with Wounds and Injuries <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Basics of The skeleton, Joints and Muscles. • Fractures (injuries to bones). 	8	1,2
2	Fundamentals of FirstAid-II	G. First aid related with Nervous system and Unconsciousness <ul style="list-style-type: none"> • Basics of the nervous system. • Unconsciousness, Stroke, Fits – convulsions – seizures, Epilepsy. H. First aid related with Gastrointestinal Tract <ul style="list-style-type: none"> • Basics of The gastrointestinal system. • Diarrhea, Food poisoning. I. First aid related with Skin, Burns <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Poisoning by swallowing, Gases, Injection, Skin K. First aid related with Bites and Stings <ul style="list-style-type: none"> • Animal bites, Snake bites, Insect stings and bites L. First aid related with Sense organs <ul style="list-style-type: none"> • Basic of Sense organ. • Foreign objects in the eye, ear, nose or skin. • Swallowed foreign objects. M. Specific emergency satiation and disaster management <ul style="list-style-type: none"> • 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	<p>Basic Sex Education</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 Manual-<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

<p>Name & Sign of Program Coordinator</p>	<p>Sign & Seal of HoD</p>
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