



Integral University, Lucknow

Effective from Session: 2022-23							
Course Code	LN104	Title of the Course	Essential Professional Communication	L	T	P	C
Year	I	Semester	I	3	1	0	4
Pre-Requisite	10+2	Co-requisite					
Course Objectives	<ul style="list-style-type: none"> • Developing the art of communication and learning language through literature • Knowledge of Professional, cultural and cross-cultural communication • Basic concept of structural and functional grammar; meaning and process of communication, verbal and nonverbal communication • Knowledge of reading and comprehension of general and technical articles, precise writing, summarizing, abstracting • Basic concepts of group discussion, organizing seminars and conferences • Development of Reading and Writing skills 						

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	Enhancement of writing skills in English i.e. writing application, report and various types of letters

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. The Cross Cultural Dimensions of Professional Communication.	8	CO1
2	Language through literature	Essays: 1. The Effect of Scientific Temper on Man by Bertrand Russell, 2. The Aim of Science and Humanities by Moody E Prior. B. Short Stories: 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, Portmanteau Words, Foreign 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	Basic Composition	Report Writing: What is report? Kinds and Objectives of reports, writing reports, Business Letter writing; Introduction to Business Letters, Layout of Business letters, Letters of Enquiry/Complaint Proposal writing	8	CO5

Reference Books:

1. Kumar, Sanjay and Pushp Lata., Communication Skills. Oxford University Press, Oxford 2011. 2. Raman, Meenakshi, and Sangeeta Sharma Technical Communication: Principles and Practice. Second Edition, Oxford University Press, 2012. 3. Raina, Roshan Lal, Iftikhar Alam, and Faizia Siddiqui, Professional Communication. Himalaya Publication House 2012. 4. Agarwal, Malti. Professional Communication. Krishna's Educational Publishers. 2016.

e-Learning Source:

1. <http://www.uptnotes.com/notes-professional-communication-unit-i-nas-104...> 2. <https://www.docsity.com/en/subjects/professional-communication/> 3. <https://lecturenotes.in/download/note/22690-note-for-communication-skills-for-profession...>

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	PSO4	PSO5	PSO6	PSO7
CO1	5	6	7	4	5	6	3	4	5	3	2	3	4	5	6	5	4	3
CO2	6	7	5	3	4	7	6	5	4	3	4	5	3	4	2	3	4	6
CO3	6	7	8	5	6	3	4	6	5	2	1	3	7	6	5	8	6	5
CO4	6	8	7	4	5	6	3	5	4	6	7	8	9	6	5	3	4	5
CO5	7	8	6	4	5	6	4	3	5	7	6	8	7	5	5	6	7	4

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	PY103	Title of the Course	Introductory Physics	L	T	P	C
Year	I	Semester	I	3	1	0	4
Pre-Requisite	10+2 with biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of mechanics, wave motion, relativity, and modern optics. The main goal of the course is to introduce students to introductory physics and its applications and for them to learn the fundamentals of this important topic.						

Course Outcomes	
CO1	Students will be able to articulate and describe the Inertial and non-inertial reference frames, Newton’s laws of motion, conservation principles and motion of a particle in central force field.
CO2	Students will gain an understanding of fundamental ideas of special theory of relativity such as length contraction and time dilation and mass –energy invariance.
CO3	Students will gain basic knowledge of physical characteristics of simple harmonic motion (SHM) and obtaining solution of the oscillator using differential equations. Students will understand the basics of physics of hearing, heartbeat.
CO4	Use the principles of wave motion and superposition to explain the physics of polarisation, interference, and diffraction.
CO5	Students will gain an understanding of membrane system, membrane physics and thermodynamics of transport process.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Mechanics	Galilean invariance and Newton’s Laws of motion. Dynamics of a system of particles, Conservation of momentum and energy, work energy theorem. Conservation of angular momentum, torque, Motion of a particle in central force field. Kepler’s Laws, Satellite in circular orbit and applications (Synchronous satellite, GPS, Artificial gravity, apparent weightlessness), Physiological effects of acceleration and angular motion.	8	CO-1
2	Theory of Relativity	Constancy of speed of light, postulate of Special theory of relativity, length contraction, time dilation, relativistic velocity addition, Mass-energy momentum relations Electricity: Simple circuit, Ohm’s Law. Semiconductors and amplifiers	8	CO-2
3	Waves and Oscillations	Simple harmonic motion, damped and driven harmonic oscillator, coupled oscillator, energy relation and energy transfer, normal modes, Wave equation, Travelling waves, superposition principle, pulses, Doppler effect, effects of vibrations in humans, physics of hearing.	8	CO-3
4	Modern optics	Two slit Interference, Diffraction, Resolving power, Resolution of the eye, Laser characteristics, Principle, Population inversion, Application of laser in medical science, Polarization of EM wave, Malus Law, Polarizing materials, Polarizer, Analyzer	8	CO-4
5	Membrane Systems and Membrane Physics	Micelle and Bilayer formation, structure and function. Physicochemical characterization and analysis of micelles and bilayers. Membrane equilibria and Transport. Thermodynamics of transport process. Ficks’, law, Nernst Planck Equations, Diffusion, Osmosis, Donnan effect, permeability coefficient Resting potentials, Measurement membrane conductance.	8	CO-5

Reference Books:	
1.	E. M. Purcell, Ed: “Berkeley Physics Course, Vol. 1, Mechanics” (McGraw- Hill).
2.	R. P. Feynman, R. B. Lighton and M Sands; The Feynman Lectures in Physics, Vol. 1 (BI Publications, Bombay, Delhi, Calcutta, Madras).
3.	J. C. Upadhyay: ‘Mechanics (Himalaya Publishing House)
5.	P. K. Srivastava: “Mechanics” (New Age International).
6.	Rodney Cotterill; Biophysics: An Introduction, John Wiley & Sons (year)

e-Learning Source:	
1.	NPTEL :: Physics - NOC:Physics of Biological Systems
2.	NPTEL :: Basic courses-Sem 1 and 2 - Engineering Physics I

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	2	1	3	3	2	1	3	3		
CO2	3	2	1	3	1	1	1	2	3		
CO3	3	2	1	3	1	1	1	3	2		
CO4	3	2	1	3	2	1	1	2	3		
CO5	3	2	1	3	2	2	1	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: 2015-16							
Course Code	CH112	Title of the Course	Fundamentals of Inorganic Chemistry	L	T	P	C
Year	First	Semester	First	3	1	0	4
Pre-Requisite	10+2 with Chemistry	Co-requisite					
Course Objectives	The purpose of this course is to learn about how to classify elements in different groups and periods, various bonding parameters and how can predict the shape and geometry of the molecules. Different acid-base reactions, naming and stereochemistry of complexes.						

Course Outcomes	
CO1	Justify periodic law and the periodic table to describe trends in atomic properties and make predictions about the physical and chemical behavior of various elements.
CO2	Select the type of bonding and their chemical and physical properties including electronegativities, bond distances and bond energies using different parameters.
CO3	Predict the geometry and shape of molecules by applying VB & VSEPR theories.
CO4	Identify acid/base reactions, pH determination.
CO5	Write the IUPAC names of complexes and explain the stereochemistry.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Periodic Properties	An introduction to modern periodic table, periodicity in properties of elements: Atomic and ionic radii, ionization energy, electron Affinity, electronegativity, effective nuclear charge, shielding effect.	8	CO1
2	Chemical Bonding-I	Introduction, causes of chemical combination, electronic theory of valency, general characteristics of electrovalent bond, covalent bond, coordinate bond, metallic bonding and hydrogen bonding.	8	CO2
3	Chemical Bonding-II	Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to NH ₃ , SF ₄ , ClF ₃ , ICl ₄ and H ₂ O. Molecular Orbital theory for homonuclear and heteronuclear diatomic molecules.	8	CO3
4	Acids and Bases	Elementary idea of Bronsted-Lowry and Lewis concept of acids and bases (Proton-donor acceptor and electron donor acceptor systems), Relative strengths of Lewis acids bases and the effect of substitutes and the solvent on them.	8	CO4
5	Coordination Compounds	Double salts and coordination compounds, Werner's coordination theory, IUPAC nomenclature of coordination compounds, Discussion of inner and outer orbital complexes, Isomerism (structural, optical and geometrical).	8	CO5

Reference Books:

Advanced Inorganic Chemistry Vol-I & II, Satya Prakash, G.D. Tuli, S.K. Basu, R.D. Madan, S. Chand & Co. Ltd.

Test book of Inorganic Chemistry, P.L. Soni, Sultan Chand & Sons

Simplified Course in Inorganic Chemistry, Madan & Tuli, S. Chand & Co. Ltd.

Concise Inorganic Chemistry, J.D. Lee, Black Well Sciences

Selected Topics in Inorganic Chemistry, Wahid U Malik, GD Tuli, RD Madan, S Chand Publication.

e-Learning Source:

https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/104101090/lec1.pdf

https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/104106096/lec9.pdf

<https://ocw.mit.edu/high-school/chemistry/exam-prep/structure-of-matter/chemical-bonding/>

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

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

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

Effective from Session: 2020-21							
Course Code	BS121	Title of the Course	INTRODUCTION OF BIOLOGY	L	T	P	C
Year	I	Semester	I	3	1	0	4
Pre-Requisite	10+2 with Biology	Co-requisite					
Course Objectives	The purpose of this course is to impart an understanding of different theories of origin of life and evolution. cell structure and functions, the economic importance of plants, different employment generating techniques like Sericulture, Apiculture, Lac culture, Poultry culture, Dairy industry and Vermiculture.						

Course Outcomes	
CO1	Know theories of origin of life and evolution, Biogenesis and abiogenesis; Evidence of Evolution.
CO2	Know the classification of organisms, systematics and binomial nomenclature.
CO3	Know cell structure and functions of different cell organelles. cell division and cell cycle.
CO4	Sericulture, Apiculture, Lac culture, Poultry culture, Dairy industry and Vermiculture. Methods of vermicomposting.
CO5	Economic importance of plants: timber, food, vegetables. beverages, paper and rubber plants.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Origin of life and Evolution	Origin of life: Theories of Origin of life, Biogenesis and abiogenesis. Evidences of Evolution. Theories of Evolution: Darwinism, Lamarckism.	8	CO1
2	Classification of organisms	Properties of living organisms. Whittaker's five-kingdom concept: Monera, Protista, Fungi, Plantae and Animalia. Systematics and binomial System of nomenclature. Aims and objectives of taxonomy. Outline of classification of plants (Thallophyta and embryophyta); Outline of classification of animals (Chordates and nonchordates).	8	CO2
3	Cell Structure and Function	Organization of cell (prokaryotic and eukaryotic); differences between a plant and animal cell; structure and function of cell membrane, nucleus, chloroplast, mitochondria, endoplasmic reticulum, Golgi complex and lysosome, Elementary structure of chromatin and chromosome, Cell cycle, mitosis, meiosis and its significance.	8	CO3
4	Economic Zoology	Overview of Sericulture, Apiculture, Lac culture, Poultry culture and Dairy industry. Vermiculture: Introduction and scope, Species of earthworm, Characteristics features of earthworm. Overview of methods of vermicomposting, Role of earthworm in solid waste management. Vermiwash- its importance, Vermicompost as bio-fertilizer.	8	CO4
5	Economic importance of plants	Plants used as a source of timber, food: cereals, pulses, oils, fruits and vegetables; spices and condiments; beverages and fibre. Medicinal plants and plants used as raw materials for paper and rubber.	8	CO5

Reference Books:
1. Biodiversity and Quality of Life. Sengupta. Mc Millan India Pvt. Ltd. 2. Biology: P. H. Raven & G. B. Jhonson 3. Manju Yadav, Economic Zoology- Discovery publishing house, New Delhi Pandey, 4. B.P.,1998. Economic Botany, S. Chand & Co., New Delhi. 5. Environmental studies: D. L. Manjunath, Pearson Education.
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	2	1	1	1	3	2	3			
CO2	3	1	1	1	1	3	2	3			
CO3	3	2	1	1	1	1	2	3			
CO4	3	2	2	2	1	3	3	3			
CO5	3	2	3	2	1	3	3	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	PY105	Title of the Course	Physics lab	L	T	P	C
Year	III	Semester	I	0	0	6	3
Pre-Requisite	10+2 with biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart practical knowledge of the concepts through different experiments related to its theoretical course.						

Course Outcomes	
CO1	To demonstrate how interference takes place by division of amplitude and by division of wavefront.
CO2	To demonstrate the practical applications of polarization phenomenon in finding the specific rotation and also calculate the cardinal points of a lens system
CO3	To determine the resistance per unit length of a Carey Foster's bridge wire and to calculate g and the variation of T with l for a compound pendulum.
CO4	To get an idea of viscosity of a liquid and also frequency of AC Mains
CO5	

Unit No.	Title of the Unit	Content of Unit
1	Exp-01	To determine the wave length of monochromatic light by Newton's ring.
2	Exp-02	To determine the wave length of monochromatic light with the help of Fresnel's Biprism.
3	Exp-03	To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4	Exp-04	To determine the specific rotation of cane sugar solution using Half Shade polarimeter.
5	Exp-05	To determine the resistance per unit length of a Carey Foster's bridge wire and (i) To prepare one ohm coil and (ii) To determine the specific resistance of a given wire.
6	Exp-06	To study the variation of T with l for a compound pendulum and then to determine the acceleration due to gravity, position of center of gravity of the bar and radius of gyration of the bar.
7	Exp-07	To determine the coefficient of viscosity of a liquid.
8	Exp-08	To determine the frequency of an electrically maintained tuning fork by Melde's Method

Reference Books:	
1.	Practical Physics. by R. K. Shukla, New Age International Private Limited; Third edition.
2.	B.Sc. Practical Physics by Harnam Singh and Hemne, S. Chand.
3.	B. Sc. Practical Physics by CL Arora, S Chand and Company
4.	Practical Physics by Kumar P.R.S., Prentice Hall India Learning Private Limited
5.	Engineering Physics Practical by S.K. Gupta, Krishna Prakashan

e-Learning Source:		
1.	https://youtu.be/fWhgguWc8rk	2. https://youtu.be/Bf0Tg-fNWjQ
3.	https://youtu.be/dDp_Insp_p0	
4.	https://youtu.be/N0lxwqANsd4	5. https://youtu.be/G8Rqd2HNhuk
6.	https://youtu.be/7Mq4isproEE	
7.	https://youtu.be/G8Rqd2HNhuk	8. https://youtu.be/NtfbmAw62Hw

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	PSO4	PSO5	PSO6	PSO7
CO1	3	3	2	1	3	1	3											
CO2	2	2	2	2	2	3	2											
CO3	3	3	1	3	3	1	3											
CO4	2	2	2	3	1	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: 2016-17							
Course Code	CH114	Title of the Course	Fundamentals of Organic Chemistry	L	T	P	C
Year	First	Semester	Second	3	1	0	4
Pre-Requisite	10+2 with Chemistry	Co-requisite					
Course Objectives	To learn about IUPAC rules for the nomenclature of various organic compounds, prediction of geometry, stereochemistry and mechanisms of reactions by taking some specific name reactions						

Course Outcomes	
CO1	Understand different organic compounds with respect to the functional groups and become eligible to write the name of the organic compounds scientifically (IUPAC)
CO2	Predict the state of hybridization, geometry of molecule and various electron displacement effects.
CO3	An understanding of nucleophiles, electrophiles including the prediction of mechanisms for various organic reactions.
CO4	Design the synthesis of newer organic compounds by applying various name reactions.
CO5	Interpret the reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Classification of organic compounds	Nomenclature of organic compounds, Functional groups, Homologous series, IUPAC recommendations for naming simple aliphatic, alicyclic and aromatic compounds, Polyfunctional compounds, Heterocyclic compounds.	08	01
2	Basic concepts of bonding in organic chemistry	Hybridisation, tetravalency of carbon, geometry of molecules; methane, ethane, ethylene, acetylene and benzene, Factors affecting covalent bond; Electron displacement effects, inductive, electromeric, resonance, hyperconjugation and steric effects.	08	02
3	Mechanisms of Organic Reactions	Reaction intermediates (Carbocation, carbanion and free radicals), Types of attacking reagents (electrophiles and nucleophiles), Types of Organic Reactions: Substitution reactions; electrophilic, nucleophilic (mechanisms of nucleophilic substitution reaction of alkyl halides, SN1 and SN2 and reactions, with energy profile diagrams) and free radicals, Addition reactions; electrophilic, nucleophilic and free radical, Elimination reactions; E1 & E2.	08	03
4	Name Reactions	Aldol Condensation, Cannizzaro reaction, Beckmann rearrangement, Hoffmann rearrangement, Diels-Alder reaction, Clemmensen reduction, Wolff Kishner reduction	08	04
5	Stereochemistry	Concept of isomerism, types of isomerism; structural, geometrical and optical isomerism, E and Z system of nomenclature, conformational analysis of n-butane.	08	05

Reference Books:

Advanced Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.

Organic Chemistry Vol.I & II, I.L. Finar

Fundamentals of Organic Chemistry, Nafis Haider, S. Chand & Co. Ltd.

A text book of Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.

Organic Chemistry Vol.I, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan

e-Learning Source:

https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/104101090/lec1.pdfhttps://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/104106096/lec9.pdf<https://ocw.mit.edu/high-school/chemistry/exam-prep/structure-of-matter/chemical-bonding/>

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	1	-	-	1	3	3	2	3	3	2
CO2	2	1	-	-	-	1	3	3	1	1	3	2
CO3	3	1	-	-	-	2	3	3	2	1	3	2
CO4	3	1	1	-	-	3	3	3	1	1	3	2
CO5	3	1	1	-	-	3	3	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: 2020-21							
Course Code	BS131	Title of the Course	Plant Diversity	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	10+2 with Biology	Co-requisite					
Course Objectives	The objective of this course is to enable students to identify and classify algae, fungi, bryophytes, pteridophytes and gymnosperms as well as understand their morphology, anatomy, life cycle and their economic importance.						

Course Outcomes	
CO1	Describe the general features, classification, reproduction, economic importance and life cycle of Algae
CO2	Describe the general features, classification, Reproduction, economic importance, life cycle of Fungi and Lichens..
CO3	Describe the general features, classification, Reproduction, Economic importance life cycle of Bryophytes.
CO4	Describe the general features, classification, Stellar organization and Economic importance and life cycle of Pteridophytes.
CO5	Describe the general classification of gymnosperms, their resemblances and differences with pteridophytes and angiosperms.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Algae	General features, Classification, Range of thallus organization, Reproduction, Economic importance and life Cycle with special reference to <i>Spirogyra</i> , <i>Chara</i> and <i>Polysiphonia</i> .	8	1
2	Fungi	General features, Classification, Reproduction, economic importance, life Cycle with special reference to <i>Pythium</i> , <i>Morchella</i> , <i>Puccinia</i> and Lichens	8	2
3	Bryophytes	General features, Classification, Thallus organization, Reproduction, Economic importance life Cycle with special reference to <i>Marchantia</i> and <i>Funaria</i>	8	3
4	Pteridophytes	General features, Classification, Stellar organization. Homospory and Heterospory, Economic importance and life Cycle with special reference to <i>Pteris</i>	8	4
5	Gymnosperms	General Characteristics of Gymnosperms, resemblances and differences of Gymnosperms with Pteridophytes and Angiosperms. Economic importance and life Cycle with special reference to <i>Cycus</i>	8	5

Reference Books:

1. Singh V., Pandey P.C and Jain D.K 1998, A Text book of Botany for Undergraduate
2. Fritsch F. B 1945, Structure and Reproduction of Algae Vol.I & II. Cambridge University Press.
3. Smith G.M 1955, Cryptogamic Botany Vol.I and II, McGraw Hill.
4. Vashishta B.R 1990, Botany for Degree Students, Vol 1,2 and 3. S.Chand & Co.

e-Learning Source:

1. <https://www.classcentral.com/course/swayam-plant-groups-plant-diversity-95321>

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	1	3			
CO2	3	1				2	1	3			
CO3	3	1				2	1	3			
CO4	3	1				2	1	3			
CO5	3	1				2	1	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: 2020-21							
Course Code	BS132	Title of the Course	ANIMAL DIVERSITY I “NONCHORDATES”	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	BS132	Co-requisite					
Course Objectives	The objective of this course is to enable understanding of general taxonomic rules on animal classification and the complex interactions among animals of different phyla, classification of Protista and Phylum Porifera to Echinodermata with taxonomic keys, distinguishing characters of non chordates, complex evolutionary processes and behaviour of different animals						

Course Outcomes	
CO1	The students will learn about the diversity of invertebrates and the characteristics of lower non-chordates. General characters and classification of Protozoa; structure, life-cycle and control of <i>Plasmodium</i> , <i>Entamoeba histolytica</i> , <i>Euglena</i> and <i>Paramecium</i> .
CO2	The students will learn about the general characters and classification of Porifera and Coelenterata, <i>Sycon</i> : Morphology, Canal System in Porifera <i>Obelia</i> colony, Development of <i>Hydra</i> , Polymorphism in Hydrozoa.
CO3	The students will learn about the general characters and classification of Platyhelminthes and Annelida, structure, life-cycle and control of <i>Fasciola hepatica</i> , <i>Taenia solium</i> and <i>Ascaris lubricoides</i>
CO4	The students will learn about the general characters and classification of Arthropoda and Mollusca
CO5	The students will understand General characters and classification of Echinodermata, <i>Asterias</i> – Morphology and Water-vascular system, General characters and affinities of Protochordata and Hemichordata.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Protozoa	Outline of classification of animals (Chordates and non chordates). Protozoa: General characters and classification; <i>Plasmodium</i> species, <i>Entamoeba histolytica</i> , <i>Euglena</i> and <i>Paramecium</i> - Structure, Life cycle and Control	08	CO1
2	Porifera and Coelenterata	Porifera: General characters and classification; <i>Sycon</i> : Morphology, Different types of cells in <i>Sycon</i> , canal system in Porifera. Coelenterata: General characters and classification; <i>Obelia</i> : - Morphology of <i>Obelia</i> colony, Development of <i>Hydra</i> , Polymorphism in coelenterates.	08	CO2
3	Helminths and Annelida	Helminths: General characters and classification; <i>Fasciola hepatica</i> , <i>Taenia solium</i> and <i>Ascaris lubricoides</i> : - Structure, Life cycle, Pathogenicity & control measures. Annelida: General characters and classification with special reference to Earthworm and Leech	08	CO3
4	Arthropoda and Mollusca	Arthropoda: General characters and classification with special reference to Prawn and Cockroach. Mollusca: General characters and classification with special reference to <i>Unio</i> and <i>Pila</i> .	08	CO4
5	Echinodermata and Protochordata	Echinodermata: General characters and classification; <i>Asterias</i> (Sea Star): - Morphology and water vascular system. General characters and affinities of Protochordata and Hemichordata.	08	CO5

Reference Books:

- Biodiversity and Quality of Life. Sengupta. Mc Millan India Pvt.Ltd.
- Biology: P. H. Raven& G. B.Jhonson
- Barnes, B.D. (1987). Invertebrate Zoology. 5th Edition, Saunders CollegePublishing.
- Kotpal, R. L. (1988). Protozoa. RastogiPublications
- Marshall, A.J. and Williams, W.D. (1979). Text Book of Zoology Vol. I-Invertebrates,Macmillan.
- Noble, E. R. and Noble, G. A. (1982). Parasitology-The Biology of Animal Parasites, Lea and Febiger,Philadelphia.

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	3	3	
CO2	3	1				1	2	3	3	3	
CO3	3	1				1	1	2	3	3	
CO4	3	1				1	1	2	3	3	
CO5	3	1				1	1	3	3	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: 2020-21							
Course Code	BS113	Title of the Course	FUNDAMENTALS OF MICROBIOLOGY	L	T	P	C
Year	II	Semester	III	3	1	0	4
Pre-Requisite	10+2 with Biology	Co-requisite					
Course Objectives	The objective of this course is to develop the understanding of basics of microbiology, classification of microbes, control of microorganisms, microbes in extreme environments and microbial interactions and basics of Recombination in Prokaryotes.						

Course Outcomes	
CO1	Know the basics of microbiology.
CO2	Have knowledge of the general classification of microbes.
CO3	Understand basics of Control of Microorganisms.
CO4	Study bacteriophages and microbes in extreme environments and microbial interactions.
CO5	Know the basics of recombination in Prokaryotes.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	History and classification of microbiology	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	Control of Microorganisms	Control of Microorganisms: Physical agents (Autoclave, Hot air oven, Laminar airflow and membrane filter.), chemical agents (Alcohol, Halogens and Gaseous agents, antibiotics), Radiation Methods (UV rays). Pathogenesis of microorganisms: Some common pathogenic microorganisms: Bacterial (tuberculosis, gall), viral (SARS, TMV), fungal (red rot of sugar cane, dermatitis) and protozoan (malaria).	8	CO2
3	Microbes in extreme environments and microbial interactions	Microbes in extreme environments and microbial interactions: The thermophiles alkalophiles, acidophiles and symbiosis and antibiosis among microbial population, N2 fixing microbes in agriculture and forestry.	8	CO3
4	Recombination in Prokaryotes	Recombination in Prokaryotes: Transformation, Conjugation and Transduction.	8	CO4
5	Bacteriophage	Bacteriophage: Lytic and lysogenic cycle. Stains and staining techniques: Principles of staining, Types of stains – simple stains, structural stains and Differential stains.	8	CO5

Reference Books:

1. Introduction to Microbiology, Ingraham, 2ed.
2. Brock Biology of Microorganisms, Madigan et al, 9th ed.
3. General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L. Wheelis and P.R. Painter, Macmillian
4. Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill
5. Principles of Microbiology, R.M. Atlas, Wm C. Brown Publisher.
6. The Microbial World, Roger Y. Stanier, Prentice Hall
7. Howe.C. (1995) Gene Cloning and manipulation, Cambridge University Press, USA
8. Lewin, B., Gene VI New York, Oxford University Press.

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	2	2			
CO2	3	1				2	2	2			
CO3	3	1				2	2	2			
CO4	3	1				3	1	2			
CO5	3	1				1	1	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: 2020-21							
Course Code	BS134	Title of the Course	BIOSCIENCES LAB	L	T	P	C
Year	I	Semester	II	0	0	6	3
Pre-Requisite	10+2 with Biology	Co-requisite					
Course Objectives	The objective of this course is to enable students to identify and classify the algae, fungi, lichens, mycorrhiza and bryophytes. The students will also understand the diversity and classification of animals.						

Course Outcomes	
CO1	The students will learn the Microscopic Preparation and Study of Algae and Fungi
CO2	The students will learn morphology and reproductive structures of Bryophytes, fern and Gymnosperm
CO3	The students will learn the characteristic features and diversity of Protists
CO4	The students will learn about the structure and life cycle of helminthes parasites
CO5	The students will learn the characteristics features and classification of Cockroach, <i>Asterias</i> , <i>Unio</i> and <i>Pila</i>

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Microscopic Preparation	Microscopic Preparation and Study of Algae and fungi	06	CO1
2	Morphology and anatomy of plants	Study of the morphology, reproductive structures and anatomy of Bryophytes, fern, Gymnosperm	06	CO2
3	Slides	Study of whole mount of <i>Euglena</i> , <i>Amoeba</i> and <i>Paramecium</i>	06	CO3
4	Study of pond water	Examination of pond water collected from different places for diversity in protista	06	CO3
5	Study of Parasites and specimens	Study of adult <i>Fasciola hepatica</i> , <i>Taenia solium</i> , <i>Ascaris lumbricoides</i> and their life cycles (Slides/microphotographs).	06	CO4, CO5

Reference Books:

- Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
- Hall B.K. and Hallgrímsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
- Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press. Pough H. Vertebrate life, VIII Edition, Pearson International.
- Chapman V.J & Chapman D.J, The Algae, Macmillan IndiaLtd.
- Fritsch F. B 1945, Structure and Reproduction of Algae Vol.I & II.Cambridge UniversityPress.
- Smith G.M 1955, Cryptogamic Botany Vol.I and II, McGrawHill.
- Vashishta B.R 1990, Botany for Degree Students, Vol 1,2 and 3. S.Chand &Co.

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