

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science <i>(Diploma/Degree/Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	CHSC-04T	
2	Course Title	ORGANIC AND PHYSICAL CHEMISTRY-I	
3	Course Type	DSC	
4	Pre-requisite(if,any)	-	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Master the synthesis, properties, and reactivity of various functional groups and apply this knowledge to understand their significance in organic chemistry. ➤ Employ the principles of chemical/ionic equilibria, their influencing factors and applications ➤ Interpret phase diagrams for one and two-component systems, determine degrees of freedom, and identify the triple point. ➤ Master the principles and applications of liquid-liquid mixtures using Raoult's law, Henry's law, and Nernst distribution law. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max.Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics(Course contents)		No.of Period
I	<p>A. Halides (5 hrs)</p> <p>(i) Alkyl Halides: Preparation: from alkenes and alcohols. Reactions: Nucleophilic substitution reactions of alkyl halides (alcohol, ester, nitrile & isonitrile formation, Williamson's ether synthesis), mechanism and stereochemistry of nucleophilic substitution reactions (SN1 and SN2), factors affecting SN1 and SN2 reactions.</p> <p>(ii) Aryl Halides: Chlorobenzene: Preparation by aromatic halogenation and Sandmeyer reaction. Aromatic nucleophilic substitution involving Benzyne Mechanism: KNH₂/NH₃ (or NaNH₂/NH₃). Reactivity and Relative strength of C-Halogen bond in alkyl and aryl/Vinyl halides.</p> <p>B. Alcohols & Phenols (7hrs)</p> <p>(i)Alcohols</p> <p>(a)Monohydric-nomenclature, methods of formation, Properties & chemical reactions distinction between primary, secondary & tertiary alcohols.</p> <p>(b)Dihydric alcohols: Nomenclature, methods of formation of ethylene glycol (from ethylene, epoxide, ethylene dibromide and ethylene diamine). Chemical reactions of vicinal glycols: with carbonyl compounds, dehydration, oxidative cleavage with Pb(OAc)₄ and HIO₄ and Pinacol-Pinacolone rearrangement (with mechanism).</p> <p>(c) Trihydric alcohols: Nomenclature and methods of formation (from hydrolysis of fats and oils, propene and acrolein), chemical reactions of glycerol (with PCI₅, HI, oxidation, and dehydration) and uses/applications.</p> <p>(ii)Phenols</p> <p>Nomenclature and methods of formation, physical properties, and acidic character. Resonance stabilization of phenoxide ion. Comparative acidic strength of alcohols and phenols. Electrophilic aromatic substitution, acetylation, and carboxylation. Mechanism of Fries rearrangement, Claisen rearrangement, and Reimer-Tiemann reaction.</p>		12

II	<p>Aldehydes/Ketones and acid/its derivatives</p> <p>A. Aldehydes and Ketones (6 hrs) Nomenclature and structure of the carbonyl group, synthesis of aldehydes and ketones. Acidity of alpha hydrogens and formation of enolate, Concept of reactive methylene group, Keto-enol tautomerism in Acetoacetic ester. Oxidation of aldehydes by KMnO_4, and Tollen's reagent, Reduction of aldehydes by LiAlH_4 and NaBH_4.</p> <p>Mechanism of nucleophilic additions to carbonyl group with particular emphasis on aldol, Perkin, and Knoevenagel reactions. Wittig and Mannich reaction (without mechanism), Baeyer-Villiger oxidation of Ketones (without mechanism), Cannizzaro reaction (with mechanism), MPV, Clemmensen, and Wolf-Kishner reaction.</p> <p>B. Acid & its derivatives (5 hrs)</p> <p>(i) Carboxylic Acids Nomenclature, structure, physical properties, acidity of carboxylic acids, effect of substituent on acid strength, method of preparation and chemical reaction. Hell-Volhard-Zeilinsky (HVZ) reaction, Reduction of carboxylic acids, Mechanism of decarboxylation. Di carboxylic acids: - Methods of formation and chemical reactions, effect of heat and Dehydrating agents.</p> <p>(ii) Carboxylic Acid Derivatives Structure, method of preparation & physical properties of acid chlorides, esters, amides (Urea) and acid anhydrides. Relative stability of acyl derivatives.</p>	11
III	<p>Equilibrium</p> <p>A. Chemical equilibria (3 hrs) Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constants and their quantitative dependence on temperature, pressure, and concentration, factors affecting equilibrium – Le Chatelier's principle.</p> <p>B. Ionic Equilibria (5 Hrs) Ionization of acids and bases, Strong and weak electrolytes, degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect and solubility product (with illustrative examples), Salt hydrolysis - calculation of hydrolysis constant and degree of hydrolysis for salt of strong acid and weak base, Buffer solutions – Introduction, Henderson-Hasselbalch equations for acidic and basic buffer.</p> <p>(C). Phase Equilibrium (3 hrs) (A)Gibbs phase (no derivation), phase, component and degree of freedom, Application of phase rule to one component system (water system and Sulphur systems), Reduced phase rule. Application of phase rule to two component systems: Pb-Ag system. Congruent-Ferric chloride system.</p>	11
IV	<p>Photochemistry and liquid-liquid mixtures</p> <p>A) Photochemistry (8 hrs) Interaction of radiation with matter, difference between thermal and photochemical reactions, Laws governing absorption of light, laws of photochemistry, Jablonski diagram depicting various processes, quantum yield, determination of quantum yield of reactions, reasons for low and high quantum yields. Some examples of photochemical reactions (e.g. Photochemical decomposition of Hydrogen iodide, Photosynthesis of HBr from H_2 and Br_2 and photosynthesis of HCl from H_2 and Cl_2). Photosensitization and Quenching, Photosensitized reactions.</p> <p>B)Liquid-Liquid mixtures(3 hrs) Ideal liquid mixtures, Raoult's law of ideal solutions, Henry's law and its applications, Nernst distribution law, limitations, and applications (association and dissociation - No derivation).</p>	11
Keywords	<p><i>Halides (alkyl & aryl halides), Alcohols, Phenols, Aldehydes & Ketones, Carboxylic acids & their derivatives, Equilibrium (Chemical, Ionic, and Phase equilibria), Photochemistry, Liquid-liquid mixtures.</i></p>	

Indira
 Indira
 K. L. Indira
 K. L. Indira
 Dr. K. S. K. S.
 Dr. K. S. K. S.
 Dr. K. S. K. S.
 Dr. K. S. K. S.
 Dr. K. S. K. S.
 Dr. K. S. K. S.

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Bahl, A. (2010). *Advanced organic chemistry*. S. Chand publishing.
2. Singh, J & Yadav, L. D. S. (2016) *Advanced organic chemistry*. Pragati Prakashan Meerut.
3. Puri, L. B., Sharma, L. R., & Pathania, M. S. (2013). *Principles of physical chemistry*. Vishal Publishing Co.
4. Kapoor, K. L. (2019). *A Textbook of Physical Chemistry, Thermodynamics and Chemical Equilibrium (SI Units) - Vol. 2, 6th Edition*.

Reference Books recommended-

1. Boyd, R. N., & Morrison, R. T. (1983). *Organic Chemistry: (uden title)*. Allyn and Bacon.
2. *Physical Chemistry*
3. Atkins, P. W., De Paula, J., & Keeler, J. (2023). *Atkins' physical chemistry*. Oxford university press.
4. McQuarrie, D. A., & Simon, J. D. (2004). *Molecular Thermodynamics Viva Books Pvt. Ltd.: New Delhi*.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://ncert.nic.in/ncerts/l/lech202.pdf>
- <https://unacademy.com/content/wp-content/uploads/sites/2/2022/10/30.-Aldehydes-Ketones-and-Carboxylic-Acid.pdf>
- <https://egyankosh.ac.in/bitstream/123456789/68232/3/Unit-3.pdf>
- [https://magadhmahilacollege.org/wp-content/uploads/2020/04/photochemistry and jablonski diagram M.sc II Sem.pdf](https://magadhmahilacollege.org/wp-content/uploads/2020/04/photochemistry%20and%20jablonski%20diagram%20M.sc%20II%20Sem.pdf)

Online Resources–

- e-Resources / e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

End Semester Exam(ESE): 70 Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20/20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	CHSC-04P	
2	Course Title	CHEMISTRY LAB. COURSE-IV	
3	Course Type	DSC	
4	Pre-requisite(if, any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Understand the fundamentals of organic compounds analysis including preparation of sodium extract and detection of elements. ➤ Identify functional groups and prepare derivatives. ➤ Determine the pH of various samples like water/acid/base/soil etc. ➤ Apply the concepts of phase equilibria to determine critical solution temperature and study concepts of Nernst distribution law and determine equilibrium constant of various reactions. 	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No. of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Periods
Lab./Field Training/ Experiment Contents of Course	Organic Analysis Systematic identification of organic compounds: a. Test for aliphatic and aromatic nature of substances. b. Test for saturation and unsaturation. c. Detection of elements (N, S, and halogens) in organic compounds. d. Identification of functional groups: i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketones, v) Esters vi) Carbohydrates vii) Amines viii) Amides, ix) Halogen compounds e. Determination of melting and boiling points. f. Preparation of solid derivatives. pH determination Determination of pH of soil, water. To measure the pH of various solutions using pH indicators and pH meter. To determine the value of Ka for an unknown acid. To prepare and study the properties of buffer solutions. Phase Equilibrium: 1) To determine the critical solution temperature of two partially miscible liquids (phenol-water systems). 2) To study the effect of solute such as (i) sodium chloride (NaCl), (ii) succinic acid (HOOC-CH ₂ -CH ₂ -COOH) on the critical solution temperature of two partially miscible liquids (e.g. phenol – water system). 3) To construct the phase diagram of two components (e. g. diphenylamine-benzophenone system) by cooling curve method. Nernst Distribution Law 1) To determine the partition coefficient of Iodine between water and carbon tetrachloride/Kerosene. 2) To determine the partition coefficient of benzoic acid between water and benzene.		30

	3) To determine the equilibrium constant of the reaction, $KI + I_2 = KI_3$ by distribution method.
Keywords	Organic analysis, Aromatic/Aliphatic compounds, Saturated/unsaturated compounds, Element detection, Functional groups, Derivatives for functional groups, pH, Phase equilibria, Nernst distribution law.

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Sahu, D. P. & Bapat, K. N. (2022) Unified Practical Chemistry, Navbodh Prakashan.
2. Yadav, J. B. (2006). Advanced Practical Physical Chemistry. Krishna Prakashan Media.
3. Pandey, O. P., Bajpai, D. N., Giri, S. (2010). Practical Chemistry. S. Chand Publisher.

Reference Books Recommended:

1. Moudgil, H. K. (2010). Textbook of Physical Chemistry. PHI Learning Pvt. Ltd.
2. Adamson, A. (2012). A Textbook Of Physical Chemistry. Elsevier.
3. Findlay, A. (1923). Practical Physical Chemistry. Longmans, Green.
4. Leonard, J, Lygo, B & Procter, G. (2013). Advanced Organic Practical Chemistry, CRC Press.

Online Resources–

- e-Resources / e-books and e-learning portals
- [https://faculty.ksu.edu.sa/sites/default/files/vogel - practical organic chemistry 5th edition.pdf](https://faculty.ksu.edu.sa/sites/default/files/vogel_practical_organic_chemistry_5th_edition.pdf)
- <https://tech.chemistrydocs.com/Books/Physical/Advanced-Physical-Chemistry-Experiments-by-J-N-Gurtu-&-Amit-Gurtu.pdf>
- <https://byjus.com/chemistry/conductometric-titration/>
- [https://chem.libretexts.org/Courses/University of California Davis/Chem 4B Lab%3A General Chemistry for Majors II/1%3A Thermochemistry \(Experiment\)](https://chem.libretexts.org/Courses/University_of_California_Davis/Chem_4B_Lab%3A_General_Chemistry_for_Majors_II/1%3A_Thermochemistry_(Experiment))
- https://www.ulm.edu/chemistry/courses/manuals/chem1010/experiment_10.pdf
- <https://www.masterjeeclases.com/wp-content/uploads/2019/02/11.Practical-Organic-ChemistryTheory.pdf>

Online Resources–

- e-Resources / e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA): 15 Marks

End Semester Exam(ESE): 35 Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	Managed by Course teacher as per lab. status
	J. Performed the Task based on lab. work - 20 Marks	
	K. Spotting based on tools & technology (written) – 10 Marks	
	L. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelors in Science <i>(Diploma /Degree/Honors)</i>		Semester-IV	
		Session: 2024-2025	
1	Course Code	CHSE-02T	
2	Course Title	ENVIRONMENTAL CHEMISTRY	
3	Course Type	DSE	
4	Pre-requisite(if, any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ <i>To explore the environment through the lens of chemistry, examining interactions between the biosphere, lithosphere, hydrosphere, and atmosphere.</i> ➤ <i>To delve into ecological principles, biogeochemical cycles, and the challenges of thermal and noise pollution.</i> ➤ <i>To develop concept of water quality, water management, and the multifaceted issue of water pollution take center stage.</i> ➤ <i>To investigate air pollution, soil composition, radiation chemistry, and potential solutions for environmental challenges.</i> 	
6	Credit Value	03 Credits	<i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max.Marks:100	Min. PassingMarks:40
PART-B: Content of the Course			
Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Module /Unit	Topics(Course contents)		No.of Period
I	Introduction to Environmental Chemistry Biosphere, Lithosphere, Hydrosphere and Atmosphere, Ecological principles- aspects of ecology, classification, types of ecosystems. Biogeochemical cycles- carbon, nitrogen, phosphorous, oxygen, hydrogen. Thermal pollution: sources, harmful effects, and prevention of thermal pollution. Noise pollution: sources, effects, and control of noise pollution.		12
II	Water Origin, physico-chemical properties of water, sources of water, hydrological cycle, criteria of water quality, Water management- water shed management, rainwater harvesting, water pollution- sources, consequences and harmful effects of water pollution, strategies for water pollution control.		11
III	Air Major regions of the atmosphere, composition of the atmosphere, temperature inversion and air pollution episodes, photochemistry of the atmosphere, depletion of the stratospheric ozone, greenhouse effect, greenhouse gases, remedial measures for reversion of greenhouse effect, acid rain, photochemical smog, particulate matter.		11
IV	Soil and radiation pollution Chemical and mineralogical composition of soil, classification of soil, types of soil- saline and alkaline, physical properties – texture, bulk density, permeability, chemical properties—Ion exchange capacity, soil pH and micro and macro nutrient availability. Introduction to radiation chemistry, sources of radioactive pollution, effects of radioactive pollution, protection from radiation, control of radiation.		11
<i>Keywords</i>	<i>Environment, Chemistry, Atmosphere, Hydrosphere/Biosphere/lithosphere, Biogeochemical cycles, water, water management, Air, Acid rain, Photochemical smog, Greenhouse gases,</i>		

Signature of Convener & Members (CBoS) :

PART-C

Learning Resources: Text books, Reference Books and Others

Textbooks Recommended-

1. Dara, S. S. (2002). *Environmental chemistry*. New Delhi: S Chand & Company Ltd.
2. De, A. K. (2003). *Environmental chemistry*. New Delhi: New Age International.
3. Mahajan, (2010). *Environmental chemistry*. New Delhi: S Chand & Company Ltd.
4. Kudesia, V. P. (1985). *Water pollution*. Pragati Prakashan.

Reference Books Recommended-

1. Chiras, D. D. (1994). *Environmental science (4th ed.)*. Jones & Bartlett Learning.
2. Bockris, J. O. M. (1977). *Environmental chemistry*. Academic Press.
3. Lodge, J. P. (1994). *Methods of air sampling and analysis*. Publications, Jaipur.
4. Moore, W., & Moore, J. (2010). *Environmental chemistry*. CRC Press.

OnlineResources-e-Resources/e-booksand-learningportals

- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- <https://ebooks.inflibnet.ac.in/esp16/chapter/water-pollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than%20saline%20water.>
- [https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry - The Central Science \(Brown et al.\)/18%3A_Chemistry of the Environment](https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment)
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis>

Part-D:AssessmentandEvaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA): 30 Marks

EndSemester Exam(ESE): 70 Marks

Continuous InternalAssessment (CIA):
(By Course Teacher)

Internal Test / Quiz-(2): 20 & 20
Assignment / Seminar - 10
Total Marks - 30

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks

End Semester Exam(ESE):

Two section – A & B
Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks
Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks.

Name and Signature of Convener and Members of CBoS

Dr. Vikas
Indira
Dr. Kishu
Dr. Anshu
Dr. Raju
Dr. Anshu

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Science <i>(Diploma / Degree/Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	CHSE-02P	
2	Course Title	ENVIRONMENTAL CHEMISTRY LAB. COURSE	
3	Course Type	DSE	
4	Pre-requisite (if, any)	-	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➤ To know the basic idea on techniques of water analysis and acidity alkalinity ➤ To get experience with the calculations of BOD and COD ➤ To understand the basics of soil analysis viz. pH, Conductivity. ➤ To have an experience on the determination of heavy metals in soil and Colorimetric estimation of iron and manganese. ➤ To familiarize with interpretation of data 	
6	Credit Value	01Credit	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max.Marks:50	Min. Passing Marks:20
PART-B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics(Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course.	Water Analysis a. Alkalinity b. Acidity c. Temporary, Permanent and total hardness d. Sulphate e. Phosphorus		30
	Water analysis e. Nitrites f. Chlorides g. D.O, BOD and COD h. Insecticides i. Pesticides Analysis of chemicals used in water and waste water treatment-Alum, bleaching powder, activated carbon. Determination and comparison of chlorine content in tap water, storage tank and swimming pool.		
	Soil Analysis Determination of: a. pH b. Conductivity c. Ca d. Mg e. Heavy metals like Cr, Pb, Cd, Zn.		
	Miscellaneous Analysis of nutrients – Nitrogen (total, ammonia,nitrite, and nitrate), Phosphate Determination of N,P,K of soil		

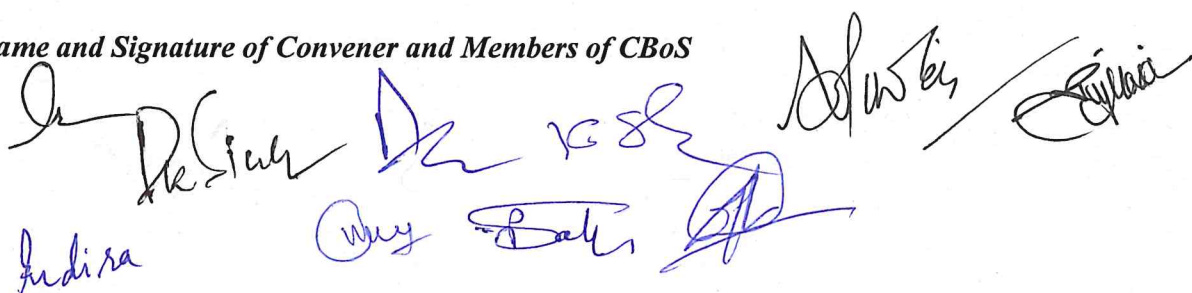
	<p>Determination of macro and micro nutrients in soil. Sampling of water- tap water, well water, overhead storage tank water pond water and lake water. Physicochemical and organoleptic characteristics of the above water samples. Statistical evaluation of the data obtained for optimization of results. Determination of Total solids, Total dissolved solids and total suspended solids and its significance. Determination of noise pollution in a particular area with noise dosimeter. Study of particulate matter. Study of atmospheric chemistry. Air Monitoring Gas detection.</p>
Keywords	Sampling, Water, soil, N/P/K, pH, Conductivity, acidity & alkalinity, Heavy metals.

Signature of Convener & Members (CBoS) :

PART-C
Learning Resources: Text Books, Reference Books and Others
<p>Textbooks Recommended-</p> <ol style="list-style-type: none"> 1. Dara, S. S., & Asole, B. G. (2017). <i>Environmental chemistry: Practical approach (2nd ed.)</i>. New Age International (India) Publishers. 2. Trivedi, R. K., Goyal, P., & Trisal, B. S. (2018). <i>Manual of water and wastewater analysis (2nd ed.)</i>. ABD Publishers & Distributors. 3. Sehgal, H. S. (2010). <i>A textbook of soil chemical analysis (2nd ed.)</i>. Kalyani <p>Reference Books Recommended-</p> <ol style="list-style-type: none"> 1. Vogel, A. I. (1955). <i>A text-book of quantitative inorganic analysis: theory and practice</i>. Longmans, Green and Company. 2. Sandell, E. B. (1945). <i>Colorimetric determination of traces of metals (Vol. 59, No. 6, p. 481)</i>. LWW. 3. Boubel, R. W., Vallerio, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). <i>Fundamentals of air pollution</i>. Elsevier. 4. Clesceri, L. S. (1998). <i>Standard methods for examination of water and wastewater</i>. American public health association, 9. 5. Rump, H. H. (1999). <i>Laboratory manual for the examination of water, waste water and soil (No. Ed. 3)</i>. Wiley-VCH Verlag GmbH. <p>Online Resources- e-Resources/e-books and e-learning portals</p> <ul style="list-style-type: none"> • https://ncert.nic.in/textbook/pdf/kech207.pdf • https://archive.nptel.ac.in/courses/122/106/122106030/ • https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/ • https://www.ncbi.nlm.nih.gov/books/NBK83730/ • https://ebooks.inflibnet.ac.in/esp16/chapter/water-pollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than%20saline%20water. • https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment • https://byjus.com/chemistry/environmental-chemistry/ • https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis • https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qal1-certification-for-so2/60799

PART -D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 50 Marks		
Continuous Internal Assessment (CIA): 15 Marks		
End Semester Exam (ESE): 35 Marks		
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment D. Performed the Task based on lab. work - 20 Marks E. Spotting based on tools & technology (written) – 10 Marks F. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener and Members of CBoS



 Indira

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life sciences <i>(Diploma / Degree/Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	BOSC-04 T	
2	Course Title	Angiosperms	
3	Course Type	Discipline Specific course (DSC)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of the course, the students will be able : > Understand basics of plant identification, classification and nomenclature > Understand the concept, diversity and evolution of Angiosperm plants. > Become familiar with the internal structure of plants and concept of plant tissues with its revolutionary concept. > Understand the reproductive system in flowering plants.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Plant taxonomy: Types of classification-artificial, natural and phylogenetic Bentham & Hooke (upto series), Engler & Prantl (upto series) and Hutchinson system of classification with its merit and demerits, Modern trends of taxonomy and Numerical taxonomy. Binomial nomenclature system. Principles and rules (ICBN/ICN) Ranks and names, Typification, author citation, valid publication, principle of priority and its limitations; Herbarium technique, important herbaria, e herbarium and Botanical gardens of India .		12
II	Taxonomic Description: Characteristics, systematics and economic importance of Dicotyledonous families- Brassicaceae, Malvaceae, Fabaceae (subfamily), Apiaceae, Rutaceae, Euphorbiaceae, Lamiaceae, Asteraceae. Monocotyledonous families -Orchidaceae, Liliaceae, Cyperaceae, Musaceae and Poaceae. (Floral features, Floral formula and floral diagram are essential]		11
III	Anatomy: Tissue system features, functions of different types of meristematic and permanent tissues. Internal Structure of dicot and monocot root stem and leaf. Root and shoot apex organization: Structure and function of cambium and secondary growth in root and stem. Wood (heartwood and sapwood, annual rings) Abnormal Secondary Growth (<i>Dracaena Achyranthes, Nyctanthes, Boerhavia</i>)		11
IV	Embryology: Structure of anther and pollen. Structure and types of ovules, Embryo sacs-types, Pollination and Fertilization, Double fertilization, Endosperm types, structure and functions Development of embryo-Dicot and monocot embryo. Concept of Apomixes and Polyembryony, Seed structure; appendages and dispersal mechanisms.		11
Keywords	Taxonomy, Herbarium, Tissue, Fertilization		
Signature of Convener & Members (CBoS) :			

- ① R. Singh
- ② K. Singh
- ③ J. Singh
- ④ M. Singh
- ⑤ D. Singh
- ⑥ H. Singh
- ⑦ K. Singh
- ⑧ S. Singh
- ⑨ P. Singh
- ⑩ V. Singh

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, San Diego, CA, USA
2. Beck, C.B. (2010). An Introduction to Plant Structure and Development, II edition.
3. Johri, B.M. (1984). Embryology of Angiosperms. Springer-Verlag, Berlin
4. Singh, G. (2012) Plant Systematics. Theory and Practice. Oxford & IBH Pvt. Ltd, New Delhi.
5. Bhojwani, SS. & Bhatnagar, SP (2011). Embryology of Angiosperms. Vikas Publication House Pvt.Lid. New Delhi 5 edition
6. Mauseth. 1.1) (1988) Plant Anatomy. The Benjamin Cummings Publisher. USA
7. Pandey, B. P. (LatesEdt), Plant Anatomy

Reference Books Recommended –

1. Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, San Diego, CA, USA
2. Beck, C.B. (2010). An Introduction to Plant Structure and Development, II edition.
3. Mauseth. 1.1) (1988) Plant Anatomy. The Benjamin Cummings Publisher. USA
4. Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge
5. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2 nd edition.
6. Maheshwari, J.K. (1963). Flora of Delhi. CSIR, New Delhi.
7. Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York
8. Saxena N.B. and Saxena S. (2012). Plant Taxonomy Pragati Prakashan.
9. Sharma O.P. (2013). Plant Taxonomy. MC GRAW HILL INDIA.
10. Sharma, M.K. (2013) Plant Structures (An Introduction to Plant Anatomy). VayuEducation of India.
11. Chopra G.L. (2005) Angiosperm, Pradeep Publication, Jalandhar.

Online Resources–

- > e-Resources / e-books and e-learning portals
- > www.swayam.ac.in
- > www.ignou.ac.in
- > www.egyankosh.ac.in
- > www.iitm.ac.in
- > www.eskillindia.org
- > www.eshiksha.mp.gov.in
- > www.vlab.co.in
- > www.internshala.com
- > www.ndl.iitkgp.ac.in

Online Resources–

- > e-Resources / e-books and e-learning portals

<https://www.fs.usda.gov/managing-land/wildflowers/pollinators/what-ispollination>
<https://www.pw.live/exams/neet/embryo/#:~:text=Dicot%20and%20monocot%20embryos%20develop,one%20that%20is%20significantly%20smaller.>

<https://byjus.com/biology/apomixis/>

<https://examupdates.in/plant-anatomy-and-embryology-book>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
End Semester Exam (ESE): 35	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

① Rishu
 ② Rande
 ③ Indira
 ④ [Signature]
 ⑤ [Signature]
 ⑥ [Signature]

⑦ [Signature]
 ⑧ [Signature]
 ⑨ [Signature]
 ⑩ [Signature]

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Sciences (Diploma / Degree/ Honors)		Semester - IV	Session: 2024-2025
1	Course Code	BOSC-04	
2	Course Title	Lab. Course – 04 (Angiosperms)	
3	Course Type	Laboratory Course	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, students will be able to: > Understand the systematic status of flowering plants. > Learn collection of local flora , identification and herbarium preparation. > Understand internal structure of different plant parts. > Understand the pollination and seed dispersal mechanism. > Understand about reproduction system in flowering plants.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)	No. of Period	
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> Description of local plants of the syllabus in semitechnical language, floral formula and floral diagrams should be drawn. Preparation of herbarium of local flora. Anatomy of primary and secondary growth in monocots and dicots stem using hand sections or permanent slides. Anatomy of root, primary and secondary structure. Study of placentation. Study of types of ovule in permanent slide. Isolation of globular, heart shape and torpedo embryo. Study of pollination by insects. 	30	
Keywords	Herbarium, Monocot, Placentation, Pollination		

Signature of Convener & Members (CBoS) :

- ①
- ②
- ③
- ④
- ⑤
- ⑥
- ⑦
- ⑧
- ⑨
- ⑩

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Pandey, B.P. (2014). Modern Practical Botany Vol. II. S. Chand and Company Ltd., NewDelhi.
2. Bendre, A.M. and Kumar A. (2003). Manual of Practical Botany Vol. II. Rastogi Publications, Meerut.
3. Santra S.C. and Chatterjee (2005). College Botany Practical Vol. II New Central Book Agency Pvt. Ltd

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- e-Resources / e-books and e-learning portals

<https://visiblebody.com/learn/biology/monocot-dicot/roots>

<https://www.toppr.com/guides/biology/differences-between/monocot-and-dicot-stem/>

<https://examupdates.in/plant-anatomy-and-embryology-book/>

https://jrs.ac.in/working_folder/DOWNLOAD-D-12-180-618C09F700115.pdf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05 Total Marks - 15	
End Semester Exam (ESE): 35	Laboratory / Field Skill Performance: On spot Assessment	Managed by Course teacher as per lab. status
	A. Performed the Task based on lab. work - 20 Marks	
	B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

- ① R. Bhowmik
- ② D. D. Dey
- ③ S. S. Saha
- ④ M. M. M. M.
- ⑤ A. A. A.
- ⑥ H. H. H.
- ⑦ K. K. K.
- ⑧ B. B. B.
- ⑨ S. S. S.
- ⑩ M. M. M.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

**DEPARTMENT OF BOTANY
COURSE CURRICULUM**

PART- A: Introduction			
Program: Bachelor in Life Science <i>(Diploma / Degree/Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	BOSE- 02 T	
2	Course Title	Microbiology and Phytopathology	
3	Course Type	Discipline specific Elective (DSE)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to get > Basic idea of different microbes present in biotic and abiotic environment. > Knowledge of principle concept and methods in the field of Microbiology and Phytopathology > Idea of living, non living and environmental causes of plant diseases. > Knowledge of different technique to isolate microbes study their cultural characteristics, > How disease occurs by microbes, their identification and control measures.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Microbiology: ❖ General account, distribution and classification of microorganism. ❖ Major microbes of air soil water and food ❖ Isolation and cultivation of microorganism ❖ Important tools and techniques used in microbiological studies.		12
II	Plant pathology: ❖ Nature and concept of diseases in plants, ❖ History and development of plant pathology, contribution of Indian plant pathologist in India and abroad, pathology and trends in 21 st century ❖ Symptom of parasitic and non-parasitic diseases, ❖ Classification of plant diseases. ❖ Important plant diseases caused by different Pathogens ❖ Plant quarantine ❖ HR and hypersensitivity		11
III	Techniques of Studying Plant Diseases: ❖ Field Studies, Collection of samples and its preservation. ❖ Sterilization technique- Standard Methods of sterilization - Physical methods, Chemical methods, Radiation methods, ❖ Isolation technique: Preparation of different media for growth of pathogen by using standard inoculation techniques like- plate streak, serial dilution and pour plate methods to obtain a pure culture. ❖ Staining Technique: Nature and Types of stains, ❖ Preservation : methods of preservation of culture		11
IV	Host Parasite Relation: ❖ Terms and concept ❖ Disease cycle and environmental relations ❖ Plant disease dissemination ❖ Role of enzymes and toxins in pathogenesis and mode of infection, ❖ Inoculums and inoculums potential ❖ Koch's postulates ❖ Defense mechanism in plant against pathogens, ❖ Prevention and control of plant diseases		11
Key words	Microorganism, Disease, Pathogens , Culture		
Signature of Convener & Members (CBoS) :			

① Shree
 ② Pankaj
 ③ Mr
 ④
 ⑤
 ⑥
 ⑦
 ⑧

⑦
 ⑧
 ⑨
 ⑩

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Bridges, P. (1998) Molecular Variability Of Fungal Pathogens. CAB
2. Bilgrami, K. S. and Dubey, H. C. (1985) Plant Pathology, Vikas Publ. House, Sahibabad U.P.
3. Ali, s. s. and Kulshereshta, p. (1986) plant pathology, adeeb educational, Raipur.
4. Singh, R. S. (1980) Plant Pathology, Oxford IBH Publ. Co, New Delhi.
5. Malhotra R. Plant Pathology Publisher: McGraw Hill Education India

Reference Books Recommended-

1. Agrios, G. N. (1997) Plant Pathology, Academic Press, London

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- e-Resources / e-books and e-learning portals
1. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/plant-pathology#:~:text=Plant%20pathology%20is%20a%20science,parasitic%20microorganisms%20that%20cause%20disease.>
 2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4600171/>
 3. <https://bnrc.springeropen.com/articles/10.1186/s42269-021-00627-6>
 4. <https://www.sciencedirect.com/science/article/abs/pii/S0065308X08604339>
 5. <https://www.researchgate.net/publication/371501301> Fundamentals of Plant Pathology

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

① R. Prasad
② ~~Devendra~~
② ~~M. S.~~
③ ~~Dr. S. K.~~
⑤ ~~Dr. S. K.~~
⑥ ~~Dr. S. K.~~

⑦ ~~Dr. S. K.~~
⑧ ~~Dr. S. K.~~
⑨ ~~Dr. S. K.~~
⑩ ~~Dr. S. K.~~

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Science <i>(Diploma / Degree/ Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	BOSE-02 P	
2	Course Title	Lab course 02 (Microbiology and Phytopathology)	
3	Course Type	Discipline specific Elective (DSE)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to get > Basic idea of microbes. > Culture of microbes in the laboratory > How disease occurs by microbes > Basic idea of host parasite interrelationship > Control measure of pathogen by different biological sources.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> ❖ Calibration of microscope. ❖ Study of symptoms of various plants disease caused by viruses, bacteria and fungi. ❖ Sterilization of glass wares by detergent, chromic acid and dry sterilization ❖ Preparation and sterilization of culture media NAM, PDA, to culture bacteria and fungi respectively. ❖ Isolation of micro-organism from soil, water and air by using standard inoculation technique. ❖ Identification of the isolated fungi by slide preparation. ❖ Micrometry – measurement of length and width of spore/ conidia of the isolated /given fungi. ❖ Preparation of camera lucida diagram of the isolated / given fungi. ❖ Cultural charecteristics the the cultured bacteria. ❖ Gram staining of Bacteria ❖ Host parasite relationship- slide preparation of infected / diseased portion of the host to study host parasite relationship by smearing and section cutting methods isolated from local field. ❖ Demonstration of the effect of various bio-pesticides (essential oils, neem, turmeric and garlic) against microbe/pathogens ❖ Preparation of herbarium of different plant diseases of local area 		30
Keywords	Disease. symptoms, medium, pathogenesis		

Signature of Convener & Members (CBoS) :

① *R. K. Singh*
 ② *Shruti*
 ③ *Me*
 ④ *[Signature]*
 ⑤ *[Signature]*
 ⑥ *[Signature]*
 ⑦ *[Signature]*
 ⑧ *[Signature]*
 ⑨ *[Signature]*
 ⑩ *[Signature]*

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Experiments In Microbiology, Plant Pathology And Biotechnology By K. R. Aneja. Publisher New Age International

Online Resources–

➤ e-Resources / e-books and e-learning portals

1. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/plant-pathology#:~:text=Plant%20pathology%20is%20a%20science,parasitic%20microorganisms%20that%20cause%20disease.>
 2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4600171/>
 3. <https://bnrc.springeropen.com/articles/10.1186/s42269-021-00627-6>
 4. <https://www.sciencedirect.com/science/article/abs/pii/S0065308X08604339>
- 1) <https://www.researchgate.net/publication/371501301> Fundamentals of Plant Pathology

Online Resources–

➤ e-Resources / e-books and e-learning portals

- <https://efaidnbmnnnibpcajpcgclefindmkaj/https://mis.alagappauniversity.ac.in/siteAdmin/dde->
- https://admin/uploads/3/PG_M.Sc._Botony_34631%20MICROBIOLOGY%20AND%20PLANT%20PATHOLOGY.pdf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05 Total Marks - 15	
End Semester Exam (ESE): 35	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) - 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

① R. Srinivas
② Srinivas
③ M. Srinivas
④ Srinivas
⑤ Srinivas
⑥ Srinivas

⑦ Srinivas
⑧ Srinivas
⑨ Srinivas
⑩ Srinivas

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science <i>(Diploma / Degree/ Honors)</i>		Semester - IV	Session: 2024-2025
1	Course Code	ZOSC-04T	
2	Course Title	Diversity of Chordates and Comparative Anatomy	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	<p>After successfully completing this course, the students will be able to:</p> <ul style="list-style-type: none"> ➤ Develop understanding of the characters used to classify and differentiate the organisms belonging to different taxa and the evolutionary history and relationship between the different classes of chordates. ➤ Acquire knowledge and Develop critical understanding of the comparative anatomy and functioning of complex systems of Pisces to Mammalia. ➤ Learn the comparative account of integument with its derivatives, digestive system and Skeletal and Muscular System. ➤ Understand the Digestive system and its anatomical specializations with respect to different diets and feeding habits and respiratory organs in vertebrates used in aquatic, terrestrial and aerial vertebrates. ➤ Understand the evolution of heart, aortic arches, and Learn the evolution of brain, sense organs and urinogenital system. 	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Diversity in Protochordates and Chordates: General characteristics & classification of Chordata up to orders with examples. Cephalochordates: Type study – Amphioxus and its affinities, Agnatha: Comparative account of Petromyzon and Myxine		11
II	Structure and function of integument and skeletal systems Alimentary canal: Structure of integument from fishes to mammals with an account on epidermal and dermal derivatives and their functional significance, Anatomy of Axial skeleton from fishes to mammals. Comparative anatomy of appendicular skeleton: limbs and girdles from fishes to mammals. Comparative account with structure of alimentary canal and digestive glands in vertebrates.		11
III	Comparative anatomy and functional Significance of, Respiratory organs, Heart Aortic Arches and Endocrine Glands: Structure of Gills, Lungs, Air sacs and Swim bladder in Vertebrates, Structure and evolution of heart in vertebrates, Evolution of aortic arches and their significance in vertebrates. Endocrine Glands & their function. Disorders of Thyroid, Adrenal, Pancreas and Pituitary.		11
IV	Comparative anatomy and functional Significance of Urinogenital System, Brain & Sense Organ: Types and development of kidneys and their ducts in anamniotes and amniotes. Nephron- structure, types and their function, Comparative anatomy of Urinogenital system. Comparative anatomy of Brain of vertebrates, Structure of Ear and Eye.		12
Keywords	Chordates, Protochordates, Petromyzon And Myxine, Comparative Anatomy, Integument Lungs, Air Sacs Aortic Arches, Kidney, Brain		
Signature of Convener & Members (CBoS) :			

Rahalkar

Sharma

[Signature]

[Signature]

[Signature]

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition).
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Merut
- Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivrul Agarwal and Company, Indore

Reference Books Recommended –

- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Weichert, C.K. (1970) Anatomy of Chordates (4th edition).

Online Resources–

e-Resources / e-books and e-learning portal

- <https://swayamias.com/zoology-optional-coaching/>
- <https://www.swayamprabha.gov.in/index.php/program/archive/9>
- <https://www.acsedu.co.uk/Courses/Environmental/VERTEBRATE-ZOOLOGY-BEN104-528.aspx>
- <https://www.nu.edu/degrees/mathematics-and-natural-sciences/courses/bio416/>
- <https://www.youtube.com/watch?v=qSY5iXHHi88>
- <https://www.youtube.com/watch?v=tz8liJXbBCQ>
- <https://www.youtube.com/watch?v=mXECx3s8yEQ>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

Shakallia

Dr. Anil

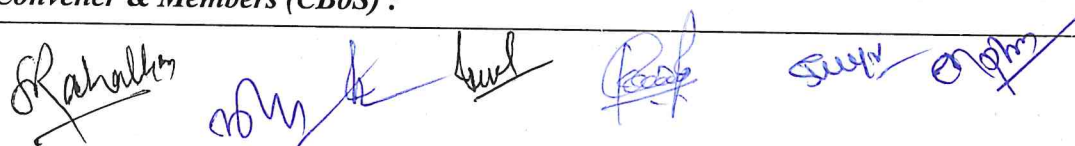
Prof. Singh

Dr. Anam

Dr.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree / Honors)		Semester - IV	Session: 2024-2025
1	Course Code	ZOSC-04P	
2	Course Title	Diversity of Chordates and Comparative Anatomy	
3	Course Type	Discipline Specific Lab Course	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p>After successfully completing lab course the students will be able to -</p> <ul style="list-style-type: none"> ➤ Develop understanding on the diversity of life with regard to different classes of vertebrates. ➤ Gain knowledge to identify and classify the animals on the basis of their morphological characteristics. ➤ Acquire the detailed knowledge about evolutionary history and relationship between the different classes of vertebrates through salient features some important animals. ➤ Learn comparative account of various systems in all the classes of vertebrates. 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<p style="text-align: center;">List of labs to be conducted</p> <ul style="list-style-type: none"> ➤ Study of animals through models, slides and museum specimens in the laboratory with details on their classification, biogeography and diagnostic features of different class of Vertebrate. ➤ Study of histological slides of different class of Vertebrate. ➤ Study of Axial skeleton of Amphibia, Reptilia, Aves and Mammals. Comparative study of Appendicular skeleton Girdles and limb bones) of Amphibia, Reptilia, Aves and Mammals. ➤ Comparative study of heart of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➤ Comparative study of Aortic Arches Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➤ Comparative study of brain of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➤ Comparative study of Urinogenital system of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➤ Histological study of Endocrine tissue ➤ Study of Vertebrate animals in nature during a survey of a National Park/ Forest area/College campus. ➤ Group discussion/Viva or Seminar presentation on any one of above topics ➤ An “animal album or Practical Record” containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. ➤ Study of some videos to develop understanding on the animals of different taxa. 		30
Keywords	<i>Museum specimens, Histological slides, Alternative of Dissection, Practical Record</i>		
Signature of Convener & Members (CBoS) :			



PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- S.S. Lal, Practical Zoology, Vertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Merut
- Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivalal Agarwal and Company, Indore

Reference Books Recommended –

- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Weichert, C.K. (1970) *Anatomy of Chordates* (4th edition).

Online Resources–

- <https://www.youtube.com/watch?v=W4gQxADeryw>
- <https://www.youtube.com/watch?v=Ts9GsrBviI8>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks	Managed by Course teacher as per lab. status
	B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree/Honors)		Semester -IV	Session: 2024-2025
1	Course Code	ZOSE-02T	
2	Course Title	Ecology and Wildlife Conservation & Management	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p>After successfully completing this course, the students will be able to:</p> <ul style="list-style-type: none"> ➤ Understand the concepts of fundamental ecological principles, including energy flow, nutrient cycling, and population dynamics. ➤ Apply the knowledge of ecology to understand equilibrium of nature. ➤ Analyze the strategies of Populations to survive and sustain. ➤ Evaluate the significance of biodiversity and its conservation. ➤ Create awareness about wildlife and nature. 	
6	Credit Value	3 Credits	<i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	<p>An overview of Ecology and Biomes: Aims and scope of Ecology. Difference between Auto-ecology and Synecology. Abiotic & Biotic factors. Ecosystem and Ecological Pyramids. Bio-geo chemical cycles. Energy flow in ecosystem: Trophic levels. Food Chain, Food Web, Food chain in fresh water ecosystem. Laws of limiting factor: Leibig's Law of Minimum, Shelford Law of tolerance. Major Biomes of the world. Biogeographic zones of India.</p>		11
II	<p>Population ecology: Population characteristics: Density, Measurement of Population Density (Quadrat method and tagging method) Mortality, Natality, Age Pyramids, Migration and Dispersal. Life tables: Survivorship curves. Population Growth: Types of Population Growth, Growth Curves (S shaped & J shaped), Mathematical Expression of population growth: logistic & stochastic. R and K strategies. Carrying Capacity. Population Regulation: extrinsic & intrinsic factors.</p>		12
III	<p>Biotic community and Environmental degradation: Biotic community characteristics and attributes: Stratification; Dominance, diversity, species richness, abundance, Evenness, Similarity. Ecotone and edge effect. Ecological succession. Species interaction: Positive interactions: commensalism, proto-cooperation and mutualism. Negative interactions: parasitism. Competition: Interspecific and Intraspecific, Lotka Volterra Model, Gause's Principle. Prey-Predator Model. Environmental degradation: Air, water and noise pollution and their control. Natural resources: Mineral, water and forest, their significance and conservation.</p>		11
IV	<p>Biodiversity & Wildlife management: Biodiversity: Concept and characteristics. Levels of Biodiversity (Genetic Diversity, Species Diversity & Ecosystem Diversity), Hotspots of Biodiversity. Major National Parks of Chhattisgarh and their biodiversity. Endemic animal species of Chhattisgarh. IUCN red list categories and criteria. Conservation of Biodiversity (In Situ, & Ex Situ Conservation). Major international & national treaties, laws and regulations for conserving biodiversity. Important conservation projects undertaken in India: Project Tiger & Project Elephant. Tiger Census and Estimation (Techniques and Findings). Cheetah re-introduction plan. Captive breeding and Propagation: Founder population, rehabilitation, education, utilization, gene banks. GIS and other technologies in Forest & Wild life conservation.</p>		11
<p>Keywords Ecology, Biome, Abiotic, Biotic factors, Nutrient Cycle, Population, Wildlife conservation, In Situ & Ex Situ</p>			
Signature of Convener & Members (CBoS) :			

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Sharma, P.D. Ecology and Environment, Rastogi Publication.
- Kumar Pranav, Meena Usha. Fundamentals of Ecology and Environment.
- Mathur Reena. Wildlife Conservation and Management, Rastogi Publication.
- Singh S.K., Text book of Wildlife Management, CBC Publishers and Distributors

Reference Books Recommended –

- Chapman, J.L. & M.J. Reiss. 1998. Ecology: Principles and Applications. Cambridge Univ. press. 2nd edition.
- Odum, E. P. (2004). Fundamentals of Ecology, Oxford and IBH Publishing Co. Pvt. Ltd.
- Smith, TM and Smith RL 2015. Elements of Ecology, Pearson Education, India.

Online Resources–

- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000035ZO/P000891/M020617/ET/1498712980Ecosystemprocesses-IPart-1Quad1.pdf
- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000035ZO/P000891/M020612/ET/1498710746CommunitycharacteristicsstratificationPart4Quad1.pdf
- http://ndl.iitkgp.ac.in/he_document/swayam_prabha/cao2zsydjqu

Online Resources–

- <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1788373>
- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000032SW/P001702/M020403/ET/14969150701-

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	

End Semester Exam (ESE):	Two section – A & B
	Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks
	Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:









FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Life Science(Diploma / Degree/ Honors)		Semester -IV	Session:2024-2025
1	CourseCode	ZOSE-02P	
2	CourseTitle	Ecology and Wildlife Conservation & Management	
3	CourseType	Discipline Specific Elective Lab Course	
4	Pre-requisite(if, any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<p>After successfully completing this course, the students will be able to:</p> <ul style="list-style-type: none"> ➤ Understand practical fieldwork skills, including sampling techniques, data collection and methods of analysis used in ecological research. ➤ Learn to design and implement ecological experiments. ➤ Understand soil profile and characteristics. ➤ Analyse chemical parameters of various water bodies. ➤ Create awareness about local fauna and evaluate biodiversity of an area. 	
6	CreditValue	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	TotalMarks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics(Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> • Study of biodegradable and non-biodegradable pollutants in the locality. • Study of a representative type of ecosystem. • Determination of pH of water samples from various water bodies. • To determine the transparency of water of Pond ecosystem by Secchi disc. • To study the profile of soil in the field/ Soil sampling by V- cut method. • To study the zooplankton communities in a fresh water ecosystem. • To prepare a checklist of birds/Insects in and around college campus. • Estimation of ecological density, diversity and frequency of college premises by quadrat method. • Estimation of Shannon – Weiner index of a given area. • Estimation of Simpson– biodiversity index of a given area. • Study of strategy for preventing and managing human-wildlife conflicts. • Project Work / Quiz / Poster / Model preparation/Viva. • Practical Record 		30
Keywords	<i>Density, Diversity, Frequency, Biodegradable, Non- biodegradable, Pollutants, Sechhi disc,</i>		
Signature of Convener & Members (CBoS):			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Yadaw Vikas, Yadaw Parul; 2022 Modern Practical Zoology; Kedar Nath Ram Nath.
- Verma P.S. A Manual of Practical Zoology Chordates, S.Chand.
- Lal S.S. Practical Zoology Vertebrate; Rastogi Publications.
- Jayasurya, Arumugam N.: Practical Zoology: Saras Publication.

Reference Books Recommended –

- Odum, E.P. 1971 Fundamentals of Ecology; W.B. Saunders
- Beard, J.M. 2013 Environmental Chemistry in Society (2nd Edition). CRC Press.

Online Resources–

- <https://www.statology.org/simpsons-diversity-index/>
- <https://www.statology.org/shannon-diversity-index/>

Online Resources–

- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000014ER/P000280/M026066/ET/1520505951paper10 Module27 etext.pdf

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

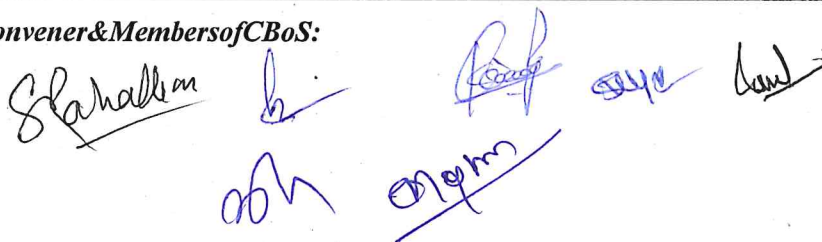
Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar + Attendance- 05 Total Marks -15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science <i>(Certificate / Diploma / Degree)</i>		Semester - II/IV/V/VI	Session: 2024-2025
1	Course Code	CHSEC	
2	Course Title	GREEN CHEMISTRY	
3	Course Type	SEC	
4	Pre-requisite(if, any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ <i>Understand needs, goals, and obstacles in green chemistry.</i> ➤ <i>Understand and application of twelve principles of chemistry.</i> ➤ <i>Design green solvents and green reactions.</i> ➤ <i>To interpret and execute case study, survey, and projects on Green Chemistry.</i> 	
6	Credit Value	2 Credits (1C + 1C)	<i>Credit = 15 Hours –Theoretical learning and = 30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No.of Teaching–learning Periods: Theory–15 Periods (15 Hrs.) and Lab. or Field learning/Training 30Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Theory Contents	<p>Introduction to Green Chemistry: What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry.</p> <p>Principles of Green Chemistry and Designing a Chemical synthesis: Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following:</p> <ul style="list-style-type: none"> • Designing a Green Synthesis using these principles; Prevention of Waste/ by products; maximum incorporation of the materials used in the process into the final products, Atom Economy, addition, substitution, and elimination reactions. • Prevention/ minimization of hazardous/ toxic products reducing toxicity, and risks (hazard × exposure); waste or pollution prevention hierarchy. • Green solvents– supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solventless processes, immobilized solvents and how to compare greenness of solvents. <p>Future Trends in Green Chemistry: Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; Green chemistry in sustainable development.</p>		15
Lab./Field Training Contents	<ul style="list-style-type: none"> • Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis). • Microwave assisted reactions in water: Hofmann elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions in organic solvents Diels-Alder reaction and Decarboxylation reaction. • Right fit pigment: synthetic azo pigments to replace toxic organic and inorganic pigments. • An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn. 		30

	Case study/Project Case study/Project on Green chemistry, Role of green chemistry in lab safety, and implications of green chemistry.	
Keywords	<i>Green chemistry, Green synthesis, Green solvents, Green reactions, principles of Green chemistry, Hofmann elimination, Diels-Alder reaction, oxidation, and reduction.</i>	

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended-

1. Ahluwalia, V.K. (2013). *Green chemistry: A textbook.* Alpha Science International.
2. Shukla, S., Gulati, S., & Batra, S.K. (2020). *A textbook of green chemistry: benign by design.* Shree kala Prakashan.
3. Kumar, V. (2013). *An introduction to green chemistry.* Vishal publishing Co.
4. Lancaster, M. (2020). *Green chemistry: an introductory text.* Royal society of chemistry.

Reference books Recommended:

1. Perosa, A., & Zecchini, F. (2007). *Methods and reagents for green chemistry: an introduction.* John Wiley & Sons.
2. Clark, J. H., & Macquarrie, D. J. (Eds.). (2008). *Handbook of green chemistry and technology.* John Wiley & Sons.
3. Ameta, S. C., & Ameta, R. (Eds.). (2023). *Green Chemistry: Fundamentals and Applications.* CRC press.
4. Anastas, P. T. (Ed.). (2013). *Handbook of green chemistry (Vol. 1).* Wiley-VCH.

Online Resources- e-Resources / e-books and e-learning portals

- https://www.mygreenlab.org/uploads/2/1/9/4/21945752/gc_-_green_chem_guide-beyond_benign_my_green_lab.pdf
- <https://www.organic-chemistry.org/topics/green-chemistry.shtm>
- <https://royalsocietypublishing.org/doi/10.1098/rsos.191378>
- <https://www.gvsu.edu/labsafety/green-chemistry-99.htm>

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

End Semester Exam(ESE): 35Marks

Continuous Internal Assessment(CIA): (By Course Coordinator)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance- 05 Total Marks -15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on learned skill - 20 Marks	Managed by Coordinator as per skilling
	B. Spotting based on tools (written) - 10 Marks	
C. Viva-voce (based on principle/technology) - 05 Marks		

Name and Signature of Convener & Members of CBoS:

Indira, K. L., A. K., K. S., A. S., S. S., S. S.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF MICROBIOLOGY
COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Certificate/Diploma/Degree)		Semester - II/ IV/V/VI	Session: 2024-25
1	Course Code	MBSEC-01	
2	Course Title	Mushroom Cultivation	
3	Course Type	Skill Enhancement Course (SEC)	
4	Prerequisite (If Any)	As per Program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to – <ul style="list-style-type: none"> ➤ explain nutritional and medicinal values of mushroom ➤ relate the types of mushrooms and their spawn preparation ➤ examine the methods of cultivation and economic aspects ➤ attain expertise using different Agro-residues for cultivation of mushrooms ➤ observe post-harvest management of mushrooms 	
6	Credit Value	02 Credits (1C + 1C)	Credit = 15 Hrs. Theoretical Learning and = 30 Hrs. Laboratory or field learning/ Training
7	Total Marks	Max. Marks: 50	Minimum Passing marks: 20

PART – B: Content of the Course		
Total No. of Teaching-Learning Periods:		
Theory – 15 Periods (15 Hrs.) and Lab. or Field Learning / Training 30 Periods (30 Hours)		
Module	Topics (Course Contents)	No. of Period
Theory Contents	<p>Introduction and Life cycle: Classification and identification of edible and nonedible mushrooms. Nutritional and medicinal value of mushroom, Scope of mushroom cultivation. Taxonomic position and Life cycle of mushroom. Types of mushrooms; Button mushroom (<i>Agaricus biporus</i>), Milky mushroom (<i>Calocybe indica</i>), Oyster mushroom (<i>Pleurotus sajor kaju</i>) and paddy straw mushroom (<i>Volvariella volvacea</i>). (Observation).</p> <p>Principles and Requisites: Sterilization and disinfection of substrates, growth medium, isolation, spawn production and maintenance. (Observation)</p> <p>Techniques of Cultivation: Structure and construction of low-cost mushroom huts, layout of Traditional and Green house method. Maintenance of proper condition in mushroom huts, Composting, bed and polythene bag preparation, Spawning-casing-cropping. (Observation).</p>	15
Lab./Field Training Contents	<ol style="list-style-type: none"> 1.Preparation of laboratory Glassware (Chemical washing, cleaning and drying). 2.Basic information about autoclave, hot air oven, laminar air flow 3.Sterilization and sanitation of mushroom house, instruments etc. 4.Identification of edible and poisonous mushrooms. 5.Preparation of Mother Culture. Spawn- media preparation, Inoculation, and incubation. 6.Preparation of different types of bed for cultivation. 7.Cultivation of Mushroom using compost/ paddy straw/agricultural wastes. 10.Harvesting and post-harvest management of crops. (Observation & Practice) 	30
Key Words	Mushroom, Spawning, Compost, Harvesting	

Name and Signature of Convener and Members of CBoS

Paul
10/6/24

Devi
20/6/24

Sudhansu

Shweta
10.6.24

Roshni
10.6.24

Dr. Nelson
10.6.24

Dr. Swetha

Dr. Swetha

Dr. Swetha

Part – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Nita Bhal. (2000). Hand book on Mushrooms. 2nded. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Tewari, S. C., Pankaj Kapoor, (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
3. Biotechnology, V. Kumaresan.

Reference Books:

1. Stamets, Paul, and J.S. Chilton. 1983. The Mushroom Cultivator. Agarikon Press, Olympia, WA. 415 p.

Online Resources – e-Resources/ e-Books and e-learning portals

- [https://nios.ac.in/media/documents/vocational/mushroom production \(revised\)\(618\)/Lesson-01.pdf](https://nios.ac.in/media/documents/vocational/mushroom%20production%20(revised)(618)/Lesson-01.pdf)
- [https://agriportal.cg.nic.in/horticulture/PDF/Download/Mushroom%20Project Part%201.pdf](https://agriportal.cg.nic.in/horticulture/PDF/Download/Mushroom%20Project%20Part%201.pdf)
- <http://nhb.gov.in/pdf/Cultivation.pdf>

PART: D ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/ Quiz – (2): 10 & 10 Assignment/ Seminar + Attendance: 05 Total Marks: 15	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 15 Marks
--	---	--

End Semester Exam (ESE):	Laboratory/ Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work – 20 Marks B. Spotting based on tools & technology (written) - 10 Marks C. Viva-voce (based on principle/ technology) – 05 Marks	Managed by Coordinator as per skilling
--------------------------	--	--

Name and Signature of Convener and Members of CBoS

Sus
10.6.24

Roshmi
10.6.24

Dr. K. V. Reddy
10.6.24

Dr. Nelson
Dr. Nelson

Plab
10/6/24

Leelavathi
10-6-24

Dr. S. Sweetlans
Dr. S. Sweetlans (Nagari)

Dank
10/6/24

FOUR YEAR UNDERGRADUATE PROGRAM (2024 –28)
DEPARTMENT OF English
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in-Arts/Science/Commerce (Diploma)		Semester -IV	Session: 2024-2025
1	Course Code	AEC- 04	
2	Course Title	Communicative English and Soft Skills	
3	Course Type	AEC [Ability Enhancement Course]	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	After completion of this course, the students will be able to: <ul style="list-style-type: none"> ➤ Learn deviant use of English both in written and spoken forms. ➤ Understand the importance of communication in English. ➤ Apply the ability to improve competence in using English language. ➤ Analyze the importance of reading skills. ➤ Develop language for speaking with confidence. 	
6	Credit Value	2 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 30 Periods (30 Hours)			
Unit	Topics (Course contents)		No. of Period
I	What is communication? <ul style="list-style-type: none"> • Purpose of Communication, • Types of Communication (Verbal and Non- Verbal), • The motivating factors (Intrinsic and Extrinsic) • Barriers of Communication (Internal and External). 		08
II	Building Vocabulary <ul style="list-style-type: none"> • Use of Dictionary, • Building Vocabulary through synonyms and antonyms, • Use of Phrasal Verbs, Idioms and Phrases • Unseen passage 		07
III	Conversation in English (Performance Based) <p>A) Reading: Very short stories (Gift of Magi, Cinderella, The Selfish Giant, Stories from Panchatantra), Newspaper reports / Fact- based articles, Diction and tone, Identifying topic sentences, Reading aloud: Reading an article/report.</p> <p>B) Spoken English for the Real world and Situational Dialogues) (any four)</p> <ul style="list-style-type: none"> • Call Center: Talking to service Providers, Professional Enquiries, Talking with peers/ seniors. • Bank: for opening an account (seeking information on loans/FDs/other schemes. • Office: (seeking information regarding job vacancy) • Market (asking for price of an object, discount etc), • Restaurant: (asking for the special dish, offerings in the menu and ordering for food) 		08

A collection of handwritten signatures and dates in blue ink, including names like 'Frank', 'Srinivas', 'Srinivas', 'Srinivas', and 'Srinivas', with dates such as '10-6-24', '10/6/24', and '10/6/24'.

	<ul style="list-style-type: none"> At the Railway Station/ Bus Station enquiry: (Arrival and departure of buses/ trains) Hotel: Booking a room, asking tariff rate Travel agency: (Asking to book tickets fares, finding vacancies in hotels) <p>C) Greetings and Common Etiquettes: Introducing oneself; Invitation; Making Requests; Expressing Gratitude; Complimenting and Congratulating; Expressing Sympathy; Apologizing; Complaining and Expressing Regret</p>	
IV	<p>Presentation skills (Performance Based):</p> <p>Effective oral presentation, Characteristics of good oral presentation. Use of quotations and anecdotes. Ways of Oral Presentation (Seminar, Viva -voce, Interview, Power Point etc.) Gestures/ Mannerism during oral presentation. Media methods used for effective oral presentation, Body Language, Attire.</p>	08
Key words	Communication, Vocabulary, Conversation, Reading, Presentation.	

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources
Text Books, Reference Books and Others
<p>Text Books Recommended - Suggested Reading:</p> <ul style="list-style-type: none"> ➤ Fluency in English - Part II, Oxford University Press, 2006. ➤ Enrich Your English, OUP, SR Inthira and V. Saraswathi, CIEFL, 1997 ➤ Oxford A-Z of English Usage, ed. Jeremy Butterfield, OUP, 2007. ➤ Longman Dictionary of Common Errors, N.D. Turton and J.B. Heaton, Longman, 1998 ➤ Contemporary Communicative English, S Chand ➤ Malhotra Perna, Deb Dulal Halder, (2019) Communication Skills: Theory and Practice, Eighth Edition, BookAge Publications, New Delhi.
<p>Online Resources-</p> <ul style="list-style-type: none"> ➤ Applying Communication Theory for Professional Life: A Practical Introduction. Dainton and Zolley, http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25f ➤ https://web.sol.du.ac.in/my_modules/type/cbcs-41-2/data/root/B.Com/Semester%202/ABILITY-ENHANCEMENT%20COMPULSORY%20COURSE-AECC/English%20Communication%20A-B-C/Unit%201-5.pdf ➤ https://archive.org/details/personality-development-book/mode/1up ➤ https://www.coursera.org/articles/presentation-skills ➤ https://www.cbs.de/en/blog/15-effective-presentation-tips-to-improve-presentation-skills/ ➤ https://benjaminball.com/blog/good-body-language-best-visual-aid-talks/ ➤ https://blog.moderngov.com/importance-of-body-language-in-presentations-good-bad-examples
PART -D: Assessment and Evaluation
<p>Suggested Continuous Evaluation Methods:</p> <p>Maximum Marks: 50 Marks</p> <p>Continuous Internal Assessment (CIA): 15 Marks</p> <p>End Semester Exam (ESE): 35 Marks</p>

10/6/24
 10/6/24
 10/6/24
 10/6/24
 10/6/24
 10/6/24
 10/6/24

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Q1. Objective/ MCQs to be asked only from Unit I (1 x5= 05 Mark) Q2. I Vocabulary: (5Marks) II Unseen Passage (5 Marks) Q3. Particles from Unit 3 & 4 consisting of 20 marks.	

Name and Signature of Convener & Members of CBoS:

[Signature]
10/6/24
[Signature]
10/6/24

[Signature]
10.6.24
[Signature]
10.6.24

[Signature]
[Signature]
10.6.24
[Signature]
10/6/24

[Signature]
10/06/24

[Signature]
10/06/24