

Minor Elective Course in Botany

Subject: Botany		
Course Code: BOT104M	Course Title: Introduction to Ecosystem	Year: I Semester: I or II
Course Outcomes: 1. Understanding of basic concepts of Ecology, Ecosystem and Environment; 2. Acquaintance with interrelationship between organisms and environment; 3. Understanding of structure and functions of ecosystem; 4. Acquaintance with local ecosystems.		
Credits: 4		Course: Minor Elective
Max. Marks: 100		Min. Passing Marks: 33
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0		
Unit	Topic	No. of lectures hrs (60)
Unit I	1. Basic concepts of Ecology, Ecosystem and Environment 2. Structure of ecosystem-biotic and abiotic components	15
Unit II	1. Classification of ecosystem 2. Functions of Ecosystem-Nutrient cycling and Energy flow	15
Unit III	1. Food chain, Food web & Ecological pyramid 2. Study of local Aquatic and Forest Ecosystem	15
Unit IV	1. Concept of ecosystem stability and factors affecting stability 2. Degraded Ecosystems and Methods of their Restoration	15

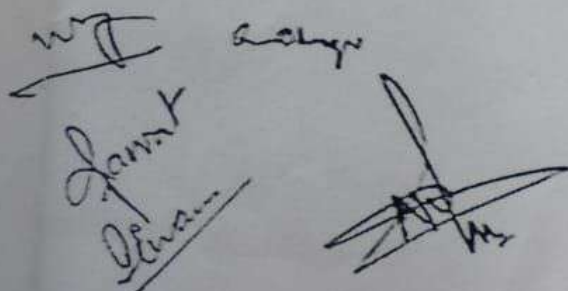
Suggested Reading:

- A Text Book of Plant Ecology: Author(s)- R.S. Ambasht and N.K. Ambasht; CBS Publishers & Distributors, New Delhi
- Ecology and Environment: Author(s)- PD Sharma; Rastogi Publications, Meerut
- Ecology, Environment and Resource Conservation: Author(s)- J.S. Singh, S.P. Singh and S.R. Gupta; S. Chand and Company Pvt. Ltd., New Delhi.

Suggested Online Link: <https://ndl.iitkgp.ac.in/> ; <http://eozp.inflibnet.ac.in/> ;
<http://egyankosh.ac.in/> ; <https://epathshala.nic.in/> ;
<https://www.digitalindia.gov.in/services>

This course can be opted as a Minor Elective paper by the students of other subjects

Suggested Continuous Evaluation: 25 Marks



Details of papers for B.Sc. I semester for the session 2022-23

1. **Mathematics(Major)**- Matrices, trigonometry, Differential calculus
2. **Mathematics(skill)**- Matrices
3. **Mathematics(Practical)**- Matlab

Details of the papers for the B.Sc. III semester for the session 2022-23

1. **Mathematics(Major)**- Integral Calculus and vector analysis
2. **Mathematics(Skill)**- Integral calculus

List of all Papers in Six Semesters AND Semester-wise Titles of the Papers in HINDI

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
Certificate Course in ARTS-HINDI					
FIRST YEAR	I		प्राचीन एवं भक्तिकालीन काव्य Major/Core	Theory	6
			हिन्दी भाषा व व्याकरण Minor Elective	Theory	4
		गढ़वाली भाषा एवं संस्कृति Vocational/Skill Development Course	Theory	3	
	II		हिन्दी कथा साहित्य Major/Core	Theory	6
			प्रयोजनमूलक हिन्दी /Skill Development Course	Theory	3
Diploma in ARTS-HINDI					
SECOND YEAR	III		ऐतिहासिक काव्य Major/Core	Theory	6
			हिन्दी भाषा : स्वरूप Minor Elective	Theory	4
			कार्यालयी हिन्दी /Skill Development Course	Theory	3
	IV		नाटक एवं स्मारक साहित्य Major/Core	Theory	6
			रचनात्मक लेखन / Skill Development Course	Theory	3
Bachelor of ARTS-HINDI					
THIRD YEAR	V		द्विवेदीयुगीन एवं छायावादी काव्य Major/Core	Theory	5
			छायावादोत्तर हिन्दी कविता Major/Core	Theory	5
			हिन्दी की वैज्ञानिक एवं तकनीकी शब्दावली/Project	Project	4
	VI		हिन्दी निबंध Major/Core	Theory	5
			लोकसाहित्य Major/Core	Theory	5
		साहित्यिक विचारधाराओं का अध्ययन : भक्ति-आन्दोलन, छायावाद, प्रगतिवाद, राष्ट्रवाद, अस्तित्ववाद, नारीवाद, दलित विमर्श, आधुनिकताबोध, उत्तरआधुनिकता में से कोई एक	Project	4	

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Minor Chemistry course

Semester-1/2 W.E.F. Jan 2024
Paper-1 (Theory)

Programme/Class: Certificate in Introductory Chemistry	Year: First	Semester: First/Second
Paper-1 Theory Subject: Chemistry		
Course Code:	Course Title: Basics of Chemistry-I	

Course outcomes: Upon completion of this course, the students will be able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemical industry or a chemistry graduate program. Students will have theoretical aspect of periodic trends of the periodic table, provide chemists with an invaluable tool to quickly predict an element's properties. Upon successful completion of this course, the students will be able to understand aliphatic, aromatic compounds functional groups in covalent compounds.

Credits:4	Minor
Max. Marks: 25+75	Min. Passing Marks:.....

Total Number of Lectures = 60

Unit	Contents	Number of Lectures
1	Analytical approaches: Types of errors, precision & accuracy, absolute and relative uncertainty. Significant figures; significant figures in Arithmetics-addition, subtraction, multiplication and division. Mean and standard deviation.	10
2	Laboratory Apparatus: Laboratory burner; Bunsen burner, air flow regulation, obtaining warm gentle flame with the burner, hottest flame of the burner.	5
3	Steps in Chemical Analysis: Sampling, sample preparation, analysis, interpretation and preparation of report.	5
4	Use of Measuring Equipments: Pipette, burette, chemical balance, least count.	5
5	Thermochemistry: Energy changes in chemical reactions, Enthalpy, specific heat, heat capacity- constant volume and constant pressure, Standard enthalpy of formation and reactions	5
6	Atom and Molecules: Bohr's Atomic theory (only postulates), structure of an atom; nuclear particles, atomic number, mass number and Isotopes, Atomic orbitals, filling of electrons in various orbitals-Aufbau energy diagram, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity .	7

7	Ions, Molecules, bonding, molar mass and chemical reactions Ions, ionic bond and ionic compounds, Chemical equations, Reactions in aqueous medium- Arrhenius theory of acids and bases, Acid-Base reaction, definition of acid and base, neutralization, Oxidation Reduction reactions-oxidation number, Molecules and chemical formulae, molar mass, molar mass and Avogadro's number, Covalent compounds-bonding, VSEPR concept and geometry, Valence Bond theory, Hybridization, geometry of covalent molecules, Hydrogen bonding	8
8	Periodic Properties: Periodic table and periodic law, periodic classification of the elements, Periodic relationship among the elements, periodic properties-atomic size, ionization energy, electron affinity, electronegativity	5
9	Hydrocarbons, functional groups: Alkanes, alkenes, alkynes, aromatic hydrocarbons. Homologous series, Preparation and properties of ethene and ethyne. Functional groups in organic compounds-alcohols, ethers, aldehydes, ketones and carboxylic acids	5
10	Environmental chemistry: Atmospheric pollution, Ozone layer depletion, Acid rain, Greenhouse effect, smog, water pollution, soil pollution, green chemistry	5

Recommended Texts:

- Nivaldo, J. and Tro, Ho Yu Au-Yeung, Introductory Chemistry, Pearson India Education, 2017, 5th edition.
- Timberlake, K. C., and Timberlake, W., Basic Chemistry, Pearson India Education, 2017, 4th edition.
- Pavia, D.L., Lampman, G. M., Kriz, G. S, and Engel, R.G., Microscale and Macroscale Techniques in the Organic Laboratory. Harcourt College Publishers, 2001. 1st edition.

Vocational/Skill Development Course in Chemistry

Semester II

Course Title: BASIC ANALYTICAL CHEMISTRY-II

Programme/Class: Certificate in Science	Year: First	Semester: Second
Theory Subject: Vocational/Skill Development Course		
Course Code SCHE-202	Course Title: BASIC ANALYTICAL CHEMISTRY-II	

Course Objectives: This course is value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge. Basic analytical techniques will be taught in this course.

Course outcomes: After completion of the course, the student shall be able to-

1. Characterize/test various organic/inorganic molecules using different analytical techniques.
2. Analyze various soil, water and food sample along with pollution parameters.
3. Learn various laboratory methods of analysis of various parameters related to environment and can work as an environmental analyst.

Credits: 03	Elective
Max. Marks: 25 + 75	Min. Passing Marks: 40
Total Number of Hours: 45	

Unit- I. (10 Hrs)

Analysis of soil: Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators a. Determination of pH of soil samples. b. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration. c. Essential element detection in soil

Unit- II. (12 Hrs)

Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods. Important water quality parameters a. Determination of turbidity, colour, taste, pH, acidity, and alkalinity of a water sample. b. Determination of TDS, toxic metals, total hardness, dissolved oxygen (DO) BOD, COD of a water sample. Standards for drinking water as per BIS specifications.

Unit- III. (5 Hrs)

Pollution: Definition, types of pollution, pollution control measures, types of chemical pollution with examples, four major effects of chemical pollution, chemicals in e-waste and its disposal, toxic effects of chemical pollution.

Unit- IV. (10 Hrs)

Analysis of food products: Nutritional value of foods, idea about food processing and use of food preservatives. Food adulteration and its detection.

- a. Identification of adulterants coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.
- b. Analysis of preservatives and colouring matter.

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- no. 1.**
1. Elementary Physics-I
 2. Numerical Methods
 3. Computer Programming
 4. Waves and Oscillations

El.1
(One
From the
list)
(04)

El.2
(One
from the
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(06)

CERTIFICATE COURSE IN BASIC PHYSICS

Programme: *Certificate Course in Basic Physics*

Year: 1

Semester:
I/II

Subject: Physics

Course Code:

Course Title: **Elementary Physics-I**

Vocational/Minor(Experim
ents/hands on training)

Credits:04

Min. Passing Marks:33

Max.Marks:100

External Exam:75

Internal Assessment:25

Total No.of Lectures-Tutorials-Practical (in hours per week):4-0-0

Unit	Topic	No. of Lectures
Unit I	Basic Idea of Physics and it's uses in daily life, Electric charge, Conductors, Insulators and Semiconductors, Coulomb's law, Quantization and conservation of charge, Basic Idea of electric field	15

Skill Enhancement Course / Vocational Course

1. Public health and Hygiene

- Unit 1:** Scope of Public health and Hygiene – nutrition and health – classification of foods – Nutritional deficiencies - Vitamin deficiencies.
- Unit 2:** Environment and Health hazards – Environmental degradation – Pollution and associated health hazards.
- Unit 3:** Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plague, Leprosy and AIDS.
- Unit 4:** Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health

2. Sericulture

- Unit 1:** Classification of commercial varieties of mulberry. Mulberry plantation establishment and cultivation practices.
- Unit 2:** Diseases of mulberry – fungal, bacterial, viral and Nematode diseases, Deficiency diseases and their remedial measures.
- Unit 3:** Silkworm rearing operations – Chawki rearing and Late age rearing techniques.
- Unit 4:** Physical and commercial characters of Cocoons. Reeling operations, Importance of by-products of Sericulture.
- Unit 5:** Economics of Sericulture – Future and progress of Sericulture Industry in India. Prospects of Sericulture as Self-Employment venture

Vocational/Skill Enhancement Courses in Botany

(i) Bio-fertilizers

Credit: 3

Course outcome

1. Develop conceptual skill about identifying microbes, and bio-fertilizers.
2. Gain knowledge about developing commercial enterprise of bio-fertilizers.

Unit	Topic	No. of lecturers/ hrs (45)
1	General account about the microbes used as biofertilizer – <i>Rhizobium</i> – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.	10
2	<i>Azospirillum</i> : isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. <i>Azotobacter</i> : classification, characteristics – crop response to <i>Azotobacter</i> inoculum, maintenance and mass multiplication Cyanobacteria (blue green algae), <i>Azolla</i> and <i>Anabaena azollae</i> association, nitrogen fixation, factors affecting growth, blue green algae and <i>Azolla</i> in rice cultivation	15
3	Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants	10
4	Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application. National and state institutes related to the activity.	10

Suggested readings

- Dubey, R.C. (2005). A Text Book of Biotechnology. S.Chand and Co, New Delhi.
- Kumaresan, V. (2005). Biotechnology, Saras Publications, New Delhi.

- Jaha Jothi Prakash, E. (2004). Outlines of Plant Biotechnology. Inkay Publication, New Delhi.
- Saha, T.V. (2004). Vermiculture and Organic Farming. Daya Publishers.
- Subha Rao, N.S. (2000). Soil Microbiology, Oxford and IBH Publishers, New Delhi.
- Vayas, S.C, Vayas, S. and Modi, H.A. (1998). Bio-fertilizers and organic Farming. Akta Prakashan, Nadiad.

(8) Herbal Technology

Credit: 3

Course outcome

1. Develop conceptual skill about traditional Indian medicinal system, herbal medicines, their processing, storage and marketing.
2. Gain knowledge about developing commercial enterprise of herbal medicines.
3. Learn the basic tools and techniques for phytochemical analysis and propagation of the medicinal plants.

Unit	Topic	No. of lecturers/ hrs (45)
1	Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.	10
2	Pharmacognosy - systematic position medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka. Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; <i>Catharanthus roseus</i> (cardiotonic), <i>Withania somnifera</i> (drugs acting on nervous system), <i>Clerodendron phlomoides</i> (anti-rheumatic) and <i>Centella asiatica</i> (memory booster).	15
3	Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds).	10
4	Medicinal plant banks micro propagation of important species (<i>Withania somnifera</i> , neem and tulsi- Herbal foods-future of pharmacognosy). National and state institutes related to the activity.	10

Suggested readings