

DAV UNIVERSITY, JALANDHAR

DAV UNIVERSITY, JALANDHAR



SYLLABI FOR

**B.Sc. (Hons.) Environmental Sciences
(Program ID-77)**

**1st TO 6th SEMESTER
Examinations 2013–2014 Session Onwards**

Syllabi Applicable For Admissions in 2013

DAV UNIVERSITY, JALANDHAR

Scheme of Courses B.Sc. (Hons.) Environmental Sciences

Semester 1

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	EVS10 2	Environment Education	3	0	0	2	25	25	25	25	50
2	EVS10 4	Fundamentals of Environmental Science	4	1	0	4	25	25	25	25	100
3	EVS10 5	Natural Resources	4	0	0	4	25	25	25	25	100
4	CHE15 3	Organic Chemistry	4	0	0	4	25	25	25	25	100
5	PHY15 3	Optics and Lasers	4	0	0	4	25	25	25	25	100
6	BOT15 1	Plant Biology-I	4	0	0	3	25	25	25	25	75
7	SGS10 1	Human Values and Ethics	2	0	0	2	25	25	25	25	50
8	CHE15 4	Organic Chemistry Lab	0	0	3	2	-	-	-	-	50
9	PHY15 4	Optics Lab	0	0	4	2	-	-	-	-	50
10	BOT15 2	Plant Biology -ILab	0	0	2	1	-	-	-	-	25
			25	1	9	28					700

- A: Continuous Assessment:** Based on Objective Type Tests
B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test
C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test
D: End-Term Exam (Final): Based on Objective Type Tests
E: Total Marks
L: Lectures T: Tutorial P: Practical Cr: Credits

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**Scheme of Courses
B.Sc. (Hons.) Environmental Sciences**

Semester 2

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	EVS106	Environmental Ecology	4	1	0	4	25	25	25	25	100
2	PHY155	Modern Physics	4	0	0	4	25	25	25	25	100
3	BOT153	Plant Biology-II	4	0	0	3	25	25	25	25	75
4	ENG151	Basic Communication Skills	4	0	0	3	25	25	25	25	75
5	MTH170	Basic Mathematics	2	0	0	2	25	25	25	25	50
6	EVS103	Road Safety and Legal Awareness	2	0	0	2	25	25	25	25	50
7	SGS102	General Knowledge and Current Affairs	2	0	0	2	25	25	25	25	50
8	SGS104	Stenography	3	0	0	1	25	25	25	25	25
9	EVS107	Environmental Ecology Lab	0	0	4	2	-	-	-	-	50
10	PHY156	Modern Physics Lab	0	0	4	2	-	-	-	-	50
11	BOT154	Plant Biology-IIILab	0	0	2	1	-	-	-	-	25
12	ENG152	Communication Skills Lab	0	0	2	1	-	-	-	-	25
13	SGS105	Stenography Lab	0	0	1	1	-	-	-	-	25
			25	1	13	28					700

- A: Continuous Assessment: Based on Objective Type Tests
 B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test
 C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test
 D: End-Term Exam (Final): Based on Objective Type Tests
 E: Total Marks
L: Lectures T: Tutorial P: Practical Cr: Credits

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Semester 3

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	EVS201	Environmental Pollution	4	1	0	4	25	25	25	25	100
2	EVS202	Environmental Chemistry	4	0	0	3	25	25	25	25	75
3	EVS203	Waste Water Analysis	4	0	0	3	25	25	25	25	75
4	CHE253	Inorganic Chemistry	4	0	0	4	25	25	25	25	100
5	ENG180	English	4	0	0	4	25	25	25	25	100
6	ZOO253	Animal Biology-I	4	0	0	3	25	25	25	25	75
7	EVS204	Environmental Chemistry Lab	0	0	2	1	-	-	-	-	25
8	EVS205	Waste Water Analysis Lab	0	0	2	1	-	-	-	-	25
9	CHE254	Inorganic Chemistry Lab	0	0	3	2	-	-	-	-	50
10	ZOO254	Animal Biology –I Lab	0	0	2	1	-	-	-	-	25
			24	1	9	26					650

- A: Continuous Assessment: Based on Objective Type Tests
 B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test
 C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test
 D: End-Term Exam (Final): Based on Objective Type Tests
 E: Total Marks
L: Lectures T: Tutorial P: Practical Cr: Credits

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Semester 4

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	EVS206	Conservation and Management of Life Support System	4	1	0	4	25	25	25	25	100
2	EVS207	Environmental Economics	4	1	0	4	25	25	25	25	100
3	EVS208	Environment Impact Assessment and Auditing	4	0	0	3	25	25	25	25	75
4	EVS209	Indoor Pollution and Health	4	0	0	3	25	25	25	25	75
5	ZOO255	Animal Biology-II	4	0	0	3	25	25	25	25	75
6	CSA253	Basic Computer Application	4	0	0	3	25	25	25	25	75
7	EVS210	Environment Impact Assessment and Auditing Lab	0	0	2	1	-	-	-	-	25
8	EVS211	Indoor Pollution and Health Lab	0	0	2	1	-	-	-	-	25
9	CSA254	Basic Computer Application Lab	0	0	2	1	-	-	-	-	25
10	ZOO256	Animal Biology-II Lab	0	0	2	1	-	-	-	-	25
			24	2	8	24					600

- A: Continuous Assessment: Based on Objective Type Tests
 B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test
 C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test
 D: End-Term Exam (Final): Based on Objective Type Tests
 E: Total Marks
L: Lectures T: Tutorial P: Practical Cr: Credits

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**Scheme of Courses
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Semester 5

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	EVS30 1	Basic Elements and Tools of Statistics	4	1	0	4	25	25	25	25	100
2	EVS30 2	Disaster Management	4	0	0	4	25	25	25	25	100
3	EVS30 3	Environmental Geography	4	1	0	4	25	25	25	25	100
4	EVS30 4	Environment Monitoring and Assessment	4	1	0	4	25	25	25	25	100
5	CHE35 3	Physical Chemistry	4	0	0	4	25	25	25	25	100
6	EVS30 5	Environmental Geography Lab	0	0	4	2	-	-	-	-	50
7	EVS30 6	Environment Monitoring and Assessment Lab	0	0	4	2	-	-	-	-	50
8	CHE35 4	Physical Chemistry Lab	0	0	3	2	-	-	-	-	50
			20	3	11	26					650

- A: Continuous Assessment: Based on Objective Type Tests
 B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test
 C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test
 D: End-Term Exam (Final): Based on Objective Type Tests
 E: Total Marks
L: Lectures T: Tutorial P: Practical Cr: Credits

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**Scheme of Courses
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Semester 6

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	EVS307	Environment Analysis and Techniques	4	1	0	4	25	25	25	25	100
2	EVS308	Environmental Microbiology and Biotechnology	4	1	0	4	25	25	25	25	100
3	EVS309	Global Environmental Issues	4	1	0	4	25	25	25	25	100
4	EVS310	Environmental Laws	4	1	0	4	25	25	25	25	100
5	EVS311	Environment Analysis and Techniques Lab	0	0	4	2	-	-	-	-	50
6	EVS312	Environmental Microbiology and Biotechnology Lab	0	0	4	2	-	-	-	-	50
7	EVS313	Seminar	0	0	0	2	-	-	-	-	50
8	EVS314	Project Work	0	0	0	2	-	-	-	-	50
			16	4	8	24					600

- A: Continuous Assessment: Based on Objective Type Tests
 B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test
 C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test
 D: End-Term Exam (Final): Based on Objective Type Tests
 E: Total Marks
L: Lectures T: Tutorial P: Practical Cr: Credits

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Instruction for candidates (Theory Paper)

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions of equal marks. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions/problems on the UGC-NET (objective type) pattern as well as one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

* Wherever specific instructions are required these are given at the starting of that particular subject/paper

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Instruction for candidates (Practical Paper)

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions of equal marks. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions/problems on the UGC-NET (objective type) pattern as well as one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

* Wherever specific instructions are required these are given at the starting of that particular subject/paper

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Syllabus

Course Title: Environment Education

Paper Code: EVS102

L	T	P	Credits	Marks
3	0	0	2	50

Course Objective: This course aims at understanding the students in aspects of environmental problems, its potential impacts on global ecosystem and its inhabitants, solutions for these problems as well as environmental ethics which they should adopt to attain sustainable development.

Unit 1

The multidisciplinary nature of environmental studies

2 Hours

Definition, scope and importance, Need for public awareness

Natural Resources: Renewable and non-renewable resources:

8 Hours

Natural resources and associated problems.

(a) **Forest resources:** Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) **Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) **Energy resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) **Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Ecosystem:

4 Hours

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

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d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Unit II

Biodiversity and its conservation

4 Hours

- Introduction – Definition: Genetic, Species and Ecosystem Diversity
- Bio-geographical classification of India
- Value of biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, global and national efforts.
- Genetically modified crops
- Cartagena Protocol
- Biodiversity Act

Environmental Pollution

8Hours

- Definition, causes, effects and control measures of:
 - a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. Marine pollution
 - e. Noise pollution
 - f. Thermal pollution
 - g. Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

Indoor Pollution:

2 Hours

- Practical tips on how to save the self from self-inflicted pollution.
- Basics of toxicity.
- Problems of lifestyle based diseases.
- Solutions needed for safety.

Unit III

Social Issues and the Environment

7 Hours

- Population growth, variation among nations, Population explosion – Family Welfare Programmes.

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- Environment and human health,
- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Laws: The Environment Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and control of Pollution) Act 1974; The Wildlife Protection Act, 1972; Forest Conservation Act, 1980.
- Issues involved in enforcement of environmental legislation
- Public Awareness

Unit IV

Human Population and Environment 5 Hours

- Population Growth and Variations among Nations
- Population Explosion
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

Global environmental issues

5 Hours

- Stockholm Conference
- Brundtland Commission
- Montreal Protocol
- Kyoto protocol
- Earth Summit
- World Summit

Field Work

5 Hours

- Visit to a local area to document environmental assets river/ forest/ grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-Pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

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References:

1. Botkin, DB, and Keller EA. *Environmental Studies: The Earth as a living planet*. New York: John Wiley and Sons Inc., 2000.
2. De, AK. *Environmental Chemistry*. New Delhi: Wiley Eastern Ltd, 1990.
3. Odum, EP. *Basic Ecology*. Japan: Halt Saundurs, 1983.
4. Sharma, PD. *Ecology and Environment*. Meerut: Rastogi Publications, 2004.
5. Singh, JS, Singh, SP, and Gupta SR. *Ecology, Environment and Resource Conservation*. New Delhi: Anamaya Publishers, 2006.

This syllabus has been designed as per national syllabus suggested by UGC and cover 20% extra syllabus as per requisite of honour degree.

DAV UNIVERSITY, JALANDHAR

Course Title: Fundamentals of Environmental Science
Paper Code: EVS104

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: This course aims to acquaint the students with the basic fundamentals of Environmental Science and to give them an in-depth knowledge of the degradation that is taking place in environment. They will also be made conversant with the remedial steps which need to be taken to maintain ecological balance.

Learning outcome: The course will provide comprehensive knowledge of environmental issues to the students so as to enable them to play a constructive role in conserving and preserving it.

Unit 1: Understanding of Environment

Concept, ideas and components of Environment; Historical Root, Nature and Scope of Environmental Science, Man -Environment interrelationships, Moral and Ethical issues in Environmental Science, Environmental perspectives, Sustainability, Carrying Capacity.
(12 lectures)

Unit 2: Matter, Energy and Life

Elements- the material basis of life, origin and evolution of life on earth; Evolution theories(modern) and speciation mechanism; characteristics of living cells (prokaryotic and eukaryotic); responses of physical environment on living system; Energy in biosphere - sources, energy forms and energy acquisition mechanisms in living systems.(12 lectures)

Unit 3: Environmental process and planetary changes

Understanding of weather and climate changes with timescale; human response to climate change, Global and regional activities relating to 'earths' environmental perspectives.
(11 lectures)

Unit 4: Environmental Education and Awareness

Goal of Environmental Education, objectives and guiding principle, environmental literacy – formal and informal environmentalism, environmental awareness and role of NGOs, environmental movements, Green politics, National and International efforts on Environmental Protection and Conservation.
(12 lectures)

References:

1. Botkin, D B, and Keller E A. *Environmental Science: Earth as a Living Planet*. 6th ed. USA: John Wiley & Sons, 2007.
2. Mukherji, S. *Fragile Environment*. Manak Publication Pvt. Ltd, 2004.
3. Subramanian, V. *A text book in Environmental Science*. New Delhi: Narosa Publishing House, 2002.
4. Wright, R T, and Nebel BJ. *Environmental Science*. 8th Ed. Prentice Hall India Ltd., 2004.

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Course Title: Natural Resources
Paper Code: EVS105

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course will provide an in-depth knowledge of natural resources, their decay, depletion, misuse and the remedial measures to check it.

Learning outcome: The target group will be equipped with a sound knowledge of all natural resources and their importance in modern times. Hence they will be better prepared to curb their misuse and mismanagement.

Unit 1: Basics of Natural Resources

Natural Resources: Definition; Classification; Concept of renewable and non-renewable resources; their conservation and importance. Role of Individuals and NGOs in Resource Conservation: Environmental movements such as 'Chipko', Western Ghat, and Silent valley, Narmada Project agitation etc.; Role of individuals and NGO's. (10 lectures)

Unit 2: Energy, Forest and Wildlife Resources

Energy Resources: Non-renewable and conventional energy resources like coal, petroleum, fuel gases; Renewable and non-conventional energy resources like solar, wind, geothermal, tidal and wave energy, biomass, biogas and biodiesel, hydroelectric energy; Atomic energy, Energy crisis; Environmental impacts of energy exploitation, Energy conservation. Forest and Wildlife Resources: Importance of forests and wildlife; Types of forest resources; Overexploitation of forests; Deforestation; Forest management and conservation; Wildlife conservation; National parks and sanctuaries; Biosphere reserves. (16 lectures)

Unit 3: Mineral and Soil Resources

Mineral Resources: Types and Importance of minerals; Important minerals of India; Mineral extraction and environmental problems; Conservation of mineral resources; Reclamation of mining areas. Soil Resources: Importance; Classification of soils; Soil formation; Soil profile; Structure and properties of soil; Soil fertility; Major types of soil in India. (10 lectures)

Unit 4: Management of Natural Resources

Land Degradation and Management: Desertification; Soil Salinization and reclamation; Shifting cultivation; Soil erosion; Loss of soil fertility and formation of wastelands, Soil conservation. Grasslands and Grazing Lands: Definition and importance; Factors causing loss of grazing lands; Conservation. Food resources: World food problems; Malnutrition and under nutrition; Role of agriculture; Green revolution; Hazards of advanced agriculture.(12 lectures)

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References:

1. Asthana, D, and Asthana MA. *Text Book of Environmental Studies*. New Delhi: S. Chand & Co., 2000.
2. Oliver, SO, and Daniel DC. *Natural Resource Conservation: Management for a Sustainable future*. New Jersey: Prentice Hall International, 1990.
3. Purohit, SS, Shammi, QJ, and Agarwal AK. *A Text Book of Environmental Sciences*. Jodhpur, 2002.
4. Rai, GD. *Non-Conventional Energy Sources*. Delhi: Khanna Publishers, 1993.
5. Ramijhan, S K. *Agro Industrial by Products and Non-Conventional Feed for Live Stock*. New Delhi: Indian Council for Agriculture Research, 1990.
6. Sharma, PD. *Ecology and Environment*. New Delhi: Rastogi Publications, 2004.

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DAV UNIVERSITY, JALANDHAR

Course Title: Organic Chemistry

Paper Code: CHE153

L	T	P	Credits	Marks
4	0	0	4	100

Course Objectives:

This course is intended to learn the basic concepts of Organic Chemistry. The present syllabus has been framed as per the latest UGC guidelines and recent research trends in the subject. The various topics of the syllabus are grouped under different units in order to bring forth the importance of academic and laboratory skills for the undergraduate students.

Expected Prospective:

This course will equip students with the necessary chemical knowledge concerning the fundamentals in the basic areas of Organic chemistry. The students will be able to pursue their career objectives in advance education, in scientific research and in teaching careers following graduation in the course.

Unit 1: Compounds of Carbon

Differences in chemical and physical behaviour as consequences of structure. Discussion (with mechanism) of reactions of hydrocarbons' ranging from saturated acyclic and alicyclic, unsaturated dienes and aromatic systems. Huckel rule; as applied to $4n+2$ systems. Industrial sources and utility of such compounds in daily life for medicine clothing and shelter. (8 Hours)

Unit 2: Stereochemistry

Structure, reactivity and stereochemistry. Configuration and conformation. Optical activity due to chirality; d,l, meso and diastereoisomerism, sequence rules. Reactions involving stereoisomerism. Geometrical isomerism – determination of configuration of geometric isomers. E & Z system of nomenclature. Conformational isomerism – conformational analysis of ethane and n-butane; conformations cyclohexane, axial and equatorial bonds, conformations of monosubstituted cyclohexane derivatives. Newman projection and Sawhorse formula, Fischer and flying wedge formulae. (15 Hours)

Unit 3: Alkyl Halides and Alcohols

Alkyl Halides: Structure of alkyl halides and their physical properties. Preparation from alcohols, hydrocarbons, alkenes and by halide exchange method. Reactions : (i) Nucleophilic substitution (SN_2 and SN_1) kinetics, mechanism, stereochemistry, steric and electronic factors, reactivity of alkyl halides, rearrangement, dependence on nucleophile, role of solvent (ii) Elimination E_2 and E_1 mechanism, stereochemistry, kinetics, rearrangement. (8 Hours)

Alcohols: Structure, physical properties (Hydrogen bonding), Methods of preparation: Grignard synthesis (scope and limitations), Reactions : Reactions with hydrogen halides. Mechanism and rearrangement, Reaction with Phosphorous trihalides, mechanism of Dehydration rearrangement. (4 Hours)

Unit 3: Ethers , Aldehydes and Ketones

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Ethers: Structure, Physical properties, preparation (Williamson synthesis). Reactions : Cleavage, by acids, Electrophilic substitution in ethers. (2 Hours)

Aldehydes and Ketones: Structure, Physical Properties; Methods of Preparation : Oxidation of Primary and secondary alcohols, Oxidation of methylbenzenes, Reduction of acid chlorides, Friedel- Crafts Acylation, Reactions ; Nucleophilic addition, Addition of Grignard reagents, Addition of cyanide. Addition of Bisulphite, Addition of derivatives of ammonia. Acetal Formation, Cannizzaro reaction, Aldol Condensation.(8 Hours)

Suggested Books:

1. Morrison, RN, and Boyd RN. *Organic Chemistry*. Dorling Kindersley (India) Pvt. Ltd., 1992.
2. Finar, IL. *Organic Chemistry*. (Volume 1), Dorling Kindersley (India) Pvt. Ltd., 1992.
3. Eliel, EL, and Wilen SH. *Stereochemistry of Organic Compounds*. London: Wiley, 1994.
4. March, J. *Advanced Organic Chemistry: Reactions, Mechanism and Structure*. 6th edition, John Wiley, 2007.

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Course Title: Optics and Lasers

Paper Code: PHY153

L	T	P	Credits	Marks
4	0	0	4	100

Total Lecture-45

AIM: The aim and objective of the course on **Optics and Lasers** for the students of B.Sc. (Hons) Chemistry, Mathematics, Microbiology, and Environmental Sciences is to enable them to understand the different phenomenon exhibited by the light as well as the basics of the laser light.

Unit1: INTERFERENCE

Young's double slit experiment, Coherent Source, Theory of interference fringes, Types of interference, Fresnel's biprism, thickness of thin transparent sheet, Interference in thin films, Newton's rings and their application, Michelson Interferometer, Application of thin film interference; Anti reflection coatings; dielectric mirrors; interference filters; Holography.
(12 Hours)

Unit 2: DIFFRACTION

Difference between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit and its discussion, Fraunhofer diffraction at double slit, missing orders in a double slit, Diffraction of N slits and its discussion, Diffraction grating, Missing orders, dispersive power, Rayleigh Criterion for resolving power, resolving power of a diffraction grating.(12 Hours)

Unit 3: POLARIZATION

Polarised light and its production; polarisers and analyzers; anisotropic crystals; Polarization by transmission and reflection, Malus Law, Brewster's Law, Polarization by refraction, anisotropic crystals, Theory of double refraction, Elliptically and circularly polarized light, Quarterwave and halfwave plates, Production and detection of polarized light, Optical activity, specific rotation. Half shade polarimeter; LCD's.(12 Hours)

Unit 4: LASERS

Attenuation of light in an optical medium; thermal equilibrium; interaction of light with matter; Einstein relations; light amplification; population inversion; active medium, pumping; metastable states; principle pumping schemes; optical resonant cavity; axial modes; gain curve and laser operating frequencies, transverse modes; types of lasers; Qswitching; laser beam characteristics and applications.(12 Hours)

Reference Books:

1. Subramanayam, N. , Lal, B. & Avadhamulu, M. N. *Textbook of Optics*. New Delhi: S. Chand & Company, 2006.
2. Jenkins, F.A. , White, H.E. *Fundamentals of Optics*, USA: McGrawHill Publication, (4th Eds.)
3. Ghatak, Ajoy, *Optics*. New Delhi: Tata McGraw Hill Publication, 2008.

DAV UNIVERSITY, JALANDHAR

Course Title: Plant Biology I
Paper Code: BOT151

L	T	P	Credits	Marks
4	0	0	3	75

UNIT I

Tissues:(a) Epidermal: stomata, trichomes, nectaries, hydathodes; Transfer cells
(b) Fundamental: parenchyma, collenchyma, and sclerenchyma; distribution of mechanical tissue. **(10 Lecture)**

UNIT-II

Tissue Systems: (c) Vascular: Xylem (general structure of primary and secondary xylem cell types); Phloem (cell types, primary phloem, secondary phloem). **(8 Lecture)**
Organization of higher plant body: The root and shoot systems; Variation in habit and longevity; Environmental influences; Modifications of root, stem and leaf. **(5 Lecture)**

UNIT-III

The Root: primary and secondary state of growth; Monocot and Dicot root. **(6 Lecture)**
The Stem: Primary and secondary state of growth; Monocot and Dicot stem. **(6 Lecture)**
Leaf: Basic structure and development of monocot and dicot leaves. **(4 Lecture)**
Phyllotaxy and veination. **(2 Lectures)**

UNIT-IV

Respiration: ATP: the biological energy currency; Aerobic and anaerobic respiration; Krebs' cycle; Mechanism of electron transport; Oxydative phosphorylation; Pentose Phosphate Pathway. **(3 Lectures)**
Photosynthesis: Introduction, history and significance; Photosynthetic pigments; Action and absorption spectra; Concepts of two photosystems; Z-scheme; Photophosphorylation; Calvin cycle; C4 pathway; CAM plants; Photorespiration. **(5 Lectures)**

Suggested Reading

1. Esau, K. *Anatomy of Seed Plants*. New York: John Wiley, 1977.
2. Fahn, A. *Plant Anatomy*. Oxford: Pergamon Press, 1990.
3. Metcalfe, C R, and Chalk L. *Anatomy of Dicotyledons*. Oxford: Clarendron Press, 1950.
4. Jane, FW. *The Structure of Wood*. London: Adam & Charles Black, 1970.

DAV UNIVERSITY, JALANDHAR

Course Title: Human Values and Ethics

Paper Code: SGS101

L	T	P	Credits	Marks
2	0	0	2	50

Course Objectives

- To sensitize students about the role and importance of human values and ethics in personal, social and professional life.
- To encourage students to read and realize the values of enlightened human beings.
- To enable students to understand and appreciate ethical concerns relevant to modern lives.

Learning Outcomes:

Students becoming responsible citizens and better professionals who practise Values and Ethics in every sphere of life.

Unit - A

Human Values

1. **Concept of Human Values:** Meaning, Types and Importance of Values. **2 hours**
2. **Human Values :** Lessons from the lives and teachings of great thinkers. **3 hours**
3. **Value Education :** The content of value education **2 hour**
4. **Value crisis and its redressal.** **1 hour**

Unit - B

Being Good and Responsible

1. Self Exploration and Self Evaluation **2 hour**
2. Acquiring Core Values for Self Development **2 hour**
3. Living in Harmony with Self, Family, Society and Nature **3 hours**
4. Values enshrined in the Constitution: Liberty, Equality Fraternity and Fundamental Duties. **3 hours**

Unit - C

Value – based living

1. Vedic values of life **2 hour**
2. *Karma Yoga* and *Jnana Yoga* **2 hours**
3. *AshtaMarga* and *Tri-Ratna* **2 hours**
4. Truth, Contentment and Wisdom **2 hours**

Unit - D

Ethical Living:

Ethics: Difference between Ethics and Values

DAV UNIVERSITY, JALANDHAR

1.	Personal Ethics	2 hours
2.	Professional Ethics	3 hours
3.	Ethics in Governance	2 hours
4.	Ethics in Education	2 hours
		Total = 35 hours

Suggested Readings:

1. Sreedharan, E, and Wakhlu, Bharat. Ed. *Restoring Values*. New Delhi: Sage Publications Ltd., 2010.
2. Nagarajan, K. *Indian Ethos and Values*. New Delhi: Tata McGraw Hill, 2011
3. Tripathi, A N. *Human Values*. New Delhi: New Age International Publishers, 2009
4. Sankar. *Indian Ethos and Values in Management*. New Delhi: Tata McGraw Hill Education Pvt. Ltd.
5. Osula. *Values and Ethics*. New Delhi: Asian Books, 2001.
6. Surbiramanian, R. *Professional Ethics*. New Delhi: Oxford University Press, 2013.
7. Anand, Rishabh. *Human Values and Professional Ethics*, New Delhi: Satya Prakashan, 2012
8. Bhalla, Sanjeev. *Human Values and Professional Ethics*. New Delhi: Satya Prakashan, 2012.
9. Soryan, Ritu. *Human Values and Professional Ethics*. New Delhi: Dhanpat Rai & Co. Pvt. Ltd., 2010.
10. Jayshree, Suresh, and B S, Raghavan. *Human Values and Professional Ethics*. New Delhi: S Chand & Co. Ltd., 2007.
11. Shukla, Dr. R K, Misra, Anuranjan. *Human Values and Professional Ethics*, A B Publication, 2010.
12. Sharma, Vayu. *Human Values and Professional Ethics*. New Delhi: Education of India Language publishers, 2012.
13. Kannan, S, and Srilakshmi, K. *Human Values and Professional Ethics*. New Delhi: Taxmann Publication, Pvt. Ltd., 2009
14. Srivastava, Smriti. *Human Values and Professional Ethics*. New Delhi: S K Kataria & Sons, 2001
15. Singh, Yogendra, and Garg, Ankur. *Human Values and Professional Ethics*. New Delhi: Aitbs publishers, 2011.

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16. Kumar, Vrinder. *Human Values and Professional Ethics*. Ludhiana: Kalyani Publishers, 2013.
17. Gaur, R R, Sangal, R. Bagaria, GP. *Human Values and Professional Ethics*. New Delhi: Excel Books, 2010.
18. Osula, Dr. Bramwell and Upadhyay, Dr. Saroj. *Values and Ethics*, New Delhi : Asian Books Pvt. Ltd., 2011.
19. *Complete works of Swami Vivekanand*, Calcutta: Advaita Ashram, 1931.
20. Radhakrishnan, S. *Indian Philosophy*, George Allen & Unwin Ltd., New York: Humanities Press INC, 1929.
21. Dwivedi, A N. *Essentials of Hinduism, Jainism and Buddhism*, New Delhi: Books Today–1979
22. Saraswati, Maharishi Dayanand. *Light of Truth: Satyarth Parkash*. New Delhi: Arya Swadhyay Kendra, 1975.
23. Bhan, Suraj. *Dayanand : His life and work*. New Delhi : DAVCMC, 2001.
24. Raghavan, V, and Iyer, N. *Moral and Political Thoughts of Mahatma Gandhi*. New Delhi : Oxford University Press India, 2000.
25. Singh, Narain. *Guru Nanak Dev's view of life*. Amritsar: Bhagat Puran Singh All India Pingalwara Society, 2010.
26. Dwivedi, Kapil Dev. *Esence of Vedas*. Hoshiarpur : Katyayan Vedic Sahitya Prakashan, 1990.
27. Chaubey, B B. *Vedic Concepts*. Hoshiarpur : Katyayan Vedic Sahitya Prakashan, 1990.
28. Radhakrishnan, Saravapalli. *Mahatma Gandhi : Essays and Reflections on his life*. Mumbai: Zaico Publication, 1977.
29. Hardayal, Lala. *Hints for Self Culture*, Mumbai: Jaico Publishing House, 1961.
30. Saraswati Dayanand, *The Light of Truth (The Satyarth Prakashan)*. New Delhi:
31. Krishnamurti J. *The First and Last Freedom*
32. Maharishi, Sri Raman. *Who Am I*.
33. Balsekar, Ramesh S. *Peace and Harmony in Daily Living*. New Delhi: Yogi Impressions.

DAV UNIVERSITY, JALANDHAR

Course Title: Organic Chemistry Lab

Paper Code: CHE154

L	T	P	Credits	Marks
0	0	3	2	50

Course Objectives:

This course is intended to learn the basic concepts of Organic Chemistry Laboratory. The present syllabus has been framed as per the latest UGC guidelines and recent research trends in the subject. The various experiments have been designed to enhance laboratory skills of the undergraduate students.

Expected Prospective:

The students will be able to understand the basic objective of experiments in organic chemistry, properly carry out the experiments, and appropriately record and analyze the results through effective writing and oral communication skills. They will know and follow the proper procedures and regulations for safe handling and use of chemicals and solvents.

1. Calibration of Thermometer

80-82° (Naphthalene), 113-114° (acetanilide).

132.5-133° (Urea), 100° (distilled Water)

2. Determination of melting point

Naphthalene 80-82°, Benzoic acid 121.5-122°

Urea, 132.5-133°, Succinic acid 184-185°

Cinnamic acid 132.5-133°, Salicylic acid 157-5-158°

Acetanilide 113-5-114°, m-Dinitrobenzene 90°

p-Dichlorobenzene 52°. Aspirin 135°.

3. Determination of boiling points

Ethanol 78°, Cyclohexane 81.4°, Toluene 110.6°, Benzene 80°.

4. Mixed melting point determination

Urea-Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1)

5. Distillation

Simple distillation of ethanol-water mixture using water condenser,

Distillation of nitrobenzene and aniline using air condenser.

6. Crystallization

Concept of induction of crystallization

Phthalic acid from hot water (using fluted filter paper and stemless funnel), Acetanilide from boiling water,

Naphthalene from ethanol,

Benzoic acid from water.

7. Decolorisation and crystallization using charcoal

Decolorisation of brown sugar (sucrose) with animal charcoal using gravity filtration.

Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g of Congo Red using 1g decolorising carbon) from ethanol.

8. Sublimation (Simple and Vacuum)

Camphor, Naphthalene, Phthalic acid and Succinic acid.

9. Extraction: the separatory funnel, drying agent:

Isolation of caffeine from tea leaves

10. Steam distillation

Purification of aniline/nitrobenzene by steam distillation.

Suggested Books:

1. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. and Smith, P.W.G. *Vogel's Text Book of Practical Organic Chemistry*, 5th edition, ELBS, 1989.
2. Pavia, D.L., Lampanana, G.M. and Kriz, G.S. Jr. *Introduction to Organic Laboratory Techniques*, Thomson Brooks/Cole, 3rd edition, 2005.
3. Mann, F.G. and Saunders. P.C. *Practical Organic Chemistry*, London: Green & Co. Ltd., 1978.
4. Svehla, G. *Vogel's Qualitative Inorganic Analysis (revised)*, Orient Longman, 7th edition, 1996.
5. Bassett, J., Denney, R.C., Jeffery, G.H. and Mendham, J. *Vogel's Textbook of Quantitative Inorganic Analysis (revised)*, Orient Longman, 4th edition, 1978.

DAV UNIVERSITY, JALANDHAR

Course Title: Optics Lab
Paper Code: PHY 154

L	T	P	Credits	Marks
0	0	4	2	50

Max Marks: 50

Objective: The laboratory exercises have been so designed that the students learn to verify some of the concepts learnt in the theory courses. They are trained in carrying out precise measurements and handling sensitive equipments.

Note:

- Students are expected to perform at least eighttten experiments out of following list. Theexperimentsperformedin firstsemestercannotbe repeatedinsecond Semester.
- Theexaminationforboththecourseswill beof3hoursduration.
- Total marks of practical will include 20% weightage of Continuous Assessment and 80% end semester exam including Notebook / Viva / Performance/ written test.

List of Experiments:

Experimental skills: General Precautions for measurements and handling of equipment, representation of measurements, Fitting of given data to a straight line, and Error analysis, Significant figures and interpretation of results

List of Experiments: Students are expected to perform at least eight experiments out of following list.

1. To determine the Refractive Index of the Material of a given Prism using Sodium Light.
2. To determine the Dispersive Power of the Material of a given Prism using Mercury Light.
3. To determine the Resolving Power of a Prism.
4. To determine wavelength of sodium light using Fresnel Biprism.
5. To determine wavelength of sodium light using Newton's Rings.
6. To determine the Thickness of a Thin Paper by measuring the Width of the Interference Fringes produced by a WedgeShaped Film.
7. To determination Wavelength of Sodium Light using Michelson's Interferometer.
8. To determine the wavelength of Laser light using Diffraction of Single Slit.
9. To determine the wavelength of (1) Sodium and (2) Mercury Light using Plane Diffraction Grating.
10. To determine the Dispersive Power of a Plane Diffraction Grating.
11. To determine the Resolving Power of a Plane Diffraction Grating.
12. To determine the (1) Wavelength and (2) Angular Spread of HeNe Laser using Plane Diffraction Grating.
13. To study the wavelength of spectral lines of sodium light using plane transmission grating.
14. To study the specific rotation of sugar solution Laurents half shade polarimeter method
15. To study the numerical aperture and propagation losses using HeNe laser Optical fibre set up.
16. To compare the focal length of two lenses by Nodal slide method.

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Course Title: Plant Biology I Lab

L	T	P	Credits	Marks
0	0	2	1	25

Paper Code: BOT152

Practicals

1. Anatomy of monocot (wheat, maize) and dicot (gram, sunflower) roots using hand sections and permanent slides.
2. Anatomy of monocot (wheat, maize) and dicot (gram, sunflower) stem using hand sections and permanent slides.
3. Anatomy of monocot (wheat, maize) and dicot (gram, sunflower) leaf using hand sections and permanent slides.
4. Study of wood anatomy (TLS of *Dalbergia* and *Pinus*).

Suggested Reading

1. Esau, K. *Anatomy of Seed Plants*. New York: John Wiley, 1977.
2. Fahn, A. *Plant Anatomy*. Oxford: Pergamon Press, 1990.
3. Metcalfe, C R, and Chalk L. *Anatomy of Dicotyledons*. Oxford: Clarendron Press, 1950.
4. Jane, FW. *The Structure of Wood*. London: Adam & Charles Black, 1970.

DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Ecology
Paper Code: EVS106

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: All human activities take place on earth using a large variety of its resources. How do we live here and use these resources, so that not only sustainable society but also life itself is sustained, need the knowledge of botany for all its citizens. The subject Environmental ecology is an applied one, wherein basic ecologic knowledge is used to maximize the utilization of all natural resources, minimize their degradation as well as minimize the destructive potential of natural processes and to sustain a healthy biosphere on earth.

Learning outcomes: Equipped with the knowledge of environmental ecology, the students will contribute used to maximize the utilization of all natural resources, minimize their degradation as well as minimize the destructive potential of natural processes and to sustain a healthy biosphere on earth.

Unit 1: Elements of Ecology

Definition, Scope and basic principles of ecology and environment; Biological levels of organization, population, community, ecosystem and biosphere; Climatic factors - Solar radiations, temperature, water and precipitation; Soil formation, soil types, soil profiles; Physical and chemical characters of soil, Soil biological characters; Topographic factors.

(10 lectures)

Unit 2: Concept of Population and Community

Population: Basic concepts, population characteristics – density, natality, mortality, age structure, population growth. Ecological niche and habitat. Positive and negative interactions of populations – competition, predation, parasitism, mutualism; Community: Basic concepts, community structure, growth forms, life form. Analytical and synthetic characters of plant community. Methods of plant community analysis; Concept of keystone species and ecotone.

(12 lectures)

Unit 3: Concept of Ecosystem

Ecosystem: Basic concepts, components of ecosystem. Trophic levels, food chains and food webs. Ecological pyramids, ecosystem functions. Energy flow in ecological systems, energy efficiencies. Major biomes of the world; Characteristics of terrestrial fresh water and marine ecosystems; Forests, grasslands, lake, river and marine ecosystems of India.

(12 lectures)

Unit 4: Ecosystem Dynamics

Biogeochemical Cycles: Importance, gaseous and sedimentary cycles; Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Global Oxygen Cycles. Hydrological cycles; Succession: Concepts of succession, Types of Succession. Trends in succession. Climax and stability. Co-evolution and group selection.

(12 lectures)

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References:

1. Botkin, DB, and Keller EA. *Environment Science: Earth as a living planet*. Third Edition. John Wiley and Sons Inc., 2000.
2. Muller-Dombois, D, and Ellenberg H. *Aims and Methods of Vegetation Ecology*. New York: Wiley, 1974.
3. Odum, EP. *Basic Ecology*. Philadelphia: Sanders, 1983.
4. Ricklefs, R. *The Ecology of Nature*. Fifth Edition. W.H. Freeman and Company, 2001.
5. Singh, KP, and Singh JS. *Tropical Ecosystems: Ecology and Management*. Lucknow: Wiley Eastern Limited, 1992.
6. Singh, JS. *Restoration of Degraded Land: Concepts and Strategies*. Meerut: Rastogi Publications, 1993.
7. Smith, RL. *Ecology and Field Biology*. New York: Harper Collins, 1996.

This syllabus has been designed as per national syllabus suggested by UGC and cover 20% extra syllabus as per requisite of honour degree.

DAV UNIVERSITY, JALANDHAR

Course Title: Modern Physics

Paper Code: PHY155

L	T	P	Credits	Marks
4	0	0	4	100

The aim and objective of the course on Modern Physics for the students of Sciences is to equip them with the knowledge of wave particle duality, quantum mechanics and atomic nucleus and radioactivity

Unit 1: Wave Particle Duality

Quantum theory of light, Xrays and their diffraction, Compton effect, pair production, Wave Properties of Particles; de Broglie waves, waves of probability, the wave equation, phase and group velocities, particle diffraction, uncertainty principle and its applications. (10 Hours)

Unit 2: Quantum Mechanics

Difference between classical and quantum mechanics, wave function and wave equations. Schrodinger's equation, time dependent and steady state forms, Expectation values, particle in a box, reflection and transmission by a barrier, tunnel effect, harmonic oscillator. (11 Hours)

Unit 3: Quantum Theory of Hydrogen Atom

Schrodinger's equation for the hydrogen atom, separation of variables, quantum numbers, principal quantum number, orbital quantum number, magnetic quantum number, electron probability density, radiative transitions, selection rules. Zeeman Effect, Anomalous Zeeman effect, Xray Spectra. (12 Hours)

Unit 4: Atomic Nucleus and Radioactivity

Nonexistence of electrons in the nucleus, The neutron, stable nuclei, nuclear sizes and shapes, binding energy, liquid drop model, shell model, meson theory of nuclear forces Radioactivity; Radioactive decay, Half-life, radioactive dating, radioactive series, alpha decay and its theory, beta decay, gammadecay, radiation hazards and radiation units. (12 Hours)

References:

1. Beiser, A. *Concepts of Modern Physics*. New York: McGraw Hill, 1987.
2. Ghatak, A and Loknatham, S. *Quantum Mechanics-Theory and Application*. Netherland: Springer, 2004.
3. Kuhn, H. *Atomic Spectra*: London; Longman Green, 1969.
4. Heyde, K. *Basic ideas and Concepts in Nuclear Physics*. Bristol: Institute of Physics, 2004.

DAV UNIVERSITY, JALANDHAR

Course Title: Plant Biology II

Paper Code: BOT153

L	T	P	Credits	Marks
4	0	0	3	75

UNIT-I

Flower: Structure, Flower as modified shoot; evolution, variations, genetic control of floral organs; Functions of flower; Inflorescence types. **(2 Lecture)**

Stamen: Morphology, evolutionary trends, structure and development of anther tapetum; Microsporogenesis, structure and development of male gametophyte; Pollen structure. **(5 Lecture)**

UNIT-II

Carpel: Morphology, evolutionary trends; Structure, development and type of ovules; placentation; Archegonium; Megasporogenesis and embryo sac ontogenies; gene function and organization. **(7 Lecture)**

Pollination: Types of pollination; pollen transfer mechanisms. **(2 Lecture)**

UNIT-III

Concept of centers of origin, their importance with reference to Vavilov's work **(1 Lecture)**

Botanical name, family, part used and uses of the following:

Food: Wheat, Rice, maize

Fruits: Mango, lemon, grapes.

Spices: Fennel, saffron, clove, turmeric ginger. **(2 Lecture)**

UNIT-IV

Botanical name, family, part used and uses of the following:

Beverages: Tea, coffee and cocoa.

Oils: groundnut, coconut, linseed and mustard.

Medicine: Cinchona, Digitalis, Rauwolfia, Papaver and Cannabis.

Timber yielding plants

Fiber yielding plants

Gums & resins

Wax and tannin yielding plants **(8 Lecture)**

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Suggested readings

1. Kocchar, SL. *Economic Botany of the Tropics*. 2nd edition, Delhi: Macmillan India Ltd, 1998.
2. Kohli, R, Arya, KS, Singh, PH, and Dhillon HS. *Tree Directory of Chandigarh*. New Delhi: Lovedale Educational 1994.
3. Thakur, RS, Puri, HS, and Husain A. *Major Medicinal Plants of India*. CSIR, Lucknow: Central Institute of Medicinal and Aromatic Plants, 1989.

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Communication Skills

Paper Code: ENG151

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective:

- To enhance students' vocabulary and comprehensive skills through prescribed texts.
- To hone students' writing skills.

Learning Outcomes:

Unit – A Applied Grammar (Socio-Cultural Context)	
• Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection	4 hours
• Tenses (Rules and Usages in Socio-cultural contexts)	5 hour
• Modals: Can, Could, May, Might, Will, Would, Shall, Should, Must, Ought to	4 hours
• Passives	3 hours
• Reported/Reporting Speech	3 hour
Unit – B Reading (Communicative Approach to be Followed)	
• J M Synge: Riders to the Sea (One Act Play)	5 hours
• Anton Chekhov : Joy (Short Story)	4 hours
• Swami Vivekanand : The Secret of Work (Prose)	5 hours
Unit – C Writing	
• Paragraph and Essay Writing	4 Hours
• Letter Writing: Formal and Informal	4 hours
• Notice and Email	4 hours

References:

a. Books

1. Kumar, Sanjay and PushpLata. *Communication Skills*. India: OUP, 2012. Print.

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2. Vandana, R. Singh. *The Written Word* by. New Delhi: Oxford University Press, 2008. Print.

b. Websites

1. www.youtube.com (to download videos for panel discussions). Web.
2. www.letterwritingguide.com. Web.
3. www.teach-nology.com. Web.
4. www.englishforeveryone.org. Web.
5. www.dailywritingtips.com. Web.
6. www.englishworksheets.com. Web.
7. www.mindtools.com. Web.

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Mathematics
Paper Code: MTH 170

L	T	P	Credits	Marks
2	0	0	2	50

Course Objective: This course is designed to introduce the fundamental concepts of continuity, differentiation and integration of functions of one variable. Its objective is to acquaint students with various applications of these topics relating to extreme value problems, problems of finding areas and distance travelled, moreover to describe connection between integral and differential calculus through Fundamental Theorem of Calculus and This course familiarizes the students with the theory of matrices.

UNIT-A

Review of trigonometric functions, sum and product formulae for trigonometric functions, Trigonometric Equations. Complex Numbers and Quadratic Equations Permutations and combinations Binomial Theorem Sequences and series (8 Hours)

UNIT-B

Matrices, Operations on Matrices, Determinants, singular and non-singular matrices, Adjoint and Inverse of a matrix.

Co-ordinate Geometry: Rectangular Coordinate system. Straight lines. Circles and family of Circles. Parabola, Ellipse and Hyperbola-their equations in standard form. (8 Hours)

UNIT-C

Introduction. Limits. Continuity. Differentiability. Exponential and Logarithmic Differentiation. Derivative of a function in parameter Second order

Integral as ant derivative. Integration by substitution, by partial fractions and by parts. Definite integral and its properties. Areas of bounded regions. The definition of integral of a real valued function of real variable as limit of sum motivated by the determination of area. Fundamental theorem of integral calculus. (8 Hours)

UNIT-D

Vector valued functions. Limit and continuity of vector functions. Differentiation of vector Functions. Arc length. Line, Surface and Volume integrals. The gradient, divergence and curl. The Del operator. Green's, Gauss' and Stokes' theorems (statements only). Applications to Physical problems. (8 Hours)

References:

1. Narayan, S, and Mittal PK. *A Text Book of Matrices*. New Delhi: S. Chand & Co. Ltd, 2002.
2. Mathematics. A Text book for Class XI and XII (Parts I & II), NCERT 2003, New Delhi.
3. Thomas, and Finney. *Calculus*, 9th Edition, Pearson Education, 2004.

DAV UNIVERSITY, JALANDHAR

Course Title: Road Safety and Legal Awareness

Paper Code: EVS103

L	T	P	Credits	Marks
2	0	0	2	50

Course Objective: This course aims to aware the students about safety measures taken during driving and commuting on roads.

Unit I

Road Safety

15 Hours

- Road safety: Concept and its importance.
- Attitude of people towards road safety
- Role of traffic police in road safety
- Traffic rules
- Traffic signs
- How to obtain driving license
- Traffic offences, penalties and procedures
- Common driving mistakes
- Significance of first-aid in road safety
- Role of civil society in road safety and Traffic police-public relationship
- Motor Vehicle Act 1998 (2010)

Unit II

Legal Awareness

10 Hours

- Legal literacy
- Child labour
- Domestic Violence
- Right to Education

References:

1. De, AK. *Environmental Chemistry*. New Delhi: Wiley Eastern Ltd, 1990.
2. Sharma, PD. *Ecology and Environment*. Meerut: Rastogi Publications, 2004.
3. Singh, JS, Singh, SP, and Gupta SR. *Ecology, Environment and Resource Conservation*. New Delhi: Anamaya Publishers, 2006.

This syllabus has been designed as per national syllabus suggested by UGC and cover 20% extra syllabus as per requisite of honour degree.

DAV UNIVERSITY, JALANDHAR

Course Title: General Knowledge and Current Affairs

Paper Code: SGS102

L	T	P	Credits	Marks
2	0	0	2	50

COURSE OBJECTIVES

The study of General Knowledge and Current Affairs has become even more important today. It is not only a major constituent of most competitive examinations but also aids in acquiring general awareness.

The objectives of this course are:

- To introduce students with the course and contents of various competitive examinations
- To prepare a foundation for appearing in various competitive examinations
- To sensitize the students about the current issues and events of national and international importance
- To provide opportunity to the students to study inter disciplinary subjects like Geography, Science, Economy, Polity, History, International Relations etc.

Learning Outcomes:

- Students would get an opportunity to aspire, plan and prepare for various competitive examinations in advance.
- It would polish their personalities and sharpen the skills of debates, group discussions, communication, interview etc.
- Students would acquire general awareness of National and International Events.

Unit — A

General Geography

World Geography :

The Universe, The Solar System, The Earth, Atmosphere, The World we live in, Countries rich in Minerals, Wonders of the World, Biggest and Smallest.

3 hours

Indian Geography :

Location, Area and Dimensions, Physical Presence, Indian States and Union Territories, Important sites and Monuments, Largest-Longest and Highest in India.

3 hours

General History

Glimpses of India History, Ancient Indian, Medieval India, Modern India, Various Phases of Indian National Movement, Prominent Personalities. Glimpses of Punjab history with special reference to period of Sikh Gurus.

3 hours

Glimpses of World History

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Important Events of World History, Revolutions and Wars of Independence, Political Philosophies like Nazism, Fascism, Communism, Capitalism, Liberalism etc. **3 hours**

Unit — B

General Polity

World Politics – Major Actors and their political relations, UNO and other organizations viz: WTO, EU, SAARC, ASEAN, BRICS, WTO, OIC, OAU, OPEC, GCC etc. **3 hours**

Indian Polity : Constitution of India :

Important Provisions, Basic Structure, Union Government, Union Legislature and Executive, State Government: State Legislature and Executive, Indian Judiciary, The Election Commission, Panchayati Raj System, RTI etc. **3 hours**

General Economy :

The process of liberalization, privatization, globalization and Major World Issues. Indian Economy, Indian Financial System, Major Economic Issues, Economic Terminology. **3 hours**

Unit — C

General Science :

General appreciation and understandings of science including the matters of everyday observation and experience. Inventions and Discoveries. **3 hours**

Sports and Recreation :

The World of Sports and recreation. Who's Who is sports, Major Events, Awards and Honours. Famous personalities, Festivals. Arts and Artists. **3 hours**

Current Affairs :

National and International Issues and Events in News. Governments Schemes and Policy Decisions. **3 hours**

India and Neighbours:

Current phase relations with China, Pakistan, Bangladesh, Nepal, Sri Lanka and Afghanistan **3 hours**

Unit — D

Miscellaneous Information

Who is who

Books and Authors, Persons in News, Awards and Honours, Abbreviations and Sports **2 hours**

Total : 35 Hours

Suggested Readings:

Reference Books:

1. Aggarwal, R. S. *Advance Objective General Knowledge*, S. Chand Publisher (2013)
2. Sen, S. *Concise General Knowledge Manual 2013*, Unique Publishers, 2013

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3. Verma, R P. *Encyclopedia of General Knowledge and General Awareness*, Penguin Books Ltd (2010)
4. Thorpe, Edgar. And Thorpe, Showick. *General Knowledge Manual 2013-14*, the Pearson, Delhi.
5. Mohanty, Mukhtikanta. *General Knowledge Manual 2013-14*, Macmillan Publishers India Ltd., Delhi.
6. India 2013, *Government of India (Ministry of Information Broadcasting)*, Publication Division, 2013.
7. Methew, Mammen. *Manorama Year Book 2013-14*, Malayalam Manorama Publishers, Kottayam, 2013.
8. *Spectrum's Handbook of General Studies – 2013-14*, Spectrum Books (P) Ltd., New Delhi
9. *Unique Quintessence of General Studies – 2013-14*, Unique Publishers, New Delhi.

Current Affairs

Magazines

Economic and Political Weekly, Yojna, the Week, India Today, Frontline, Spectrum.
Competition Success Review, Competition Master, Civil Services Chronicle, Current Affairs,
World Atlas Book

Newspapers the Hindu, Times of India, the Hindustan Times, the Tribune

DAV UNIVERSITY, JALANDHAR

Course Title: Stenography

Paper Code: SGS104

L	T	P	Credits	Marks
3	0	0	1	25

Course Objective: The course is to inculcate writing and listening skills among the students. This would act as building blocks for the learner to begin the study of stenography. As the learners are from the senior secondary background the course has been created keeping in mind their requirements for the future.

Learning Outcome:

After going through this course the participant would have understood the basic concepts of shorthand language and would be able to apply them in daily life. Completion of the course will improve their speed of writing and typing. They would be able to pronounce the English words correctly and can use effective English communication.

<p>Unit A I. The Consonants II. The Vowels III. Intervening Vowels and Position Grammalogues, Punctuation IV. Alternative Signs for r and h V. Diphthongs Abbreviated w. VI. Phaseography Tick the VII. Circle s and z—Left and Right Motion VIII. Stroke s and z IX. Large Circles sw and ss or sz X. Loops st and str.</p>	12 hours
<p>Unit B XI. Initial Hooks to Straight Strokes and Curves XII. Alternative Forms for fr, vr, etc. Intervening Vowels XIII. Circle or Loop Preceding Initial Hook XIV. n and f Hooks XV. Circles and Loops to Final Hooks.XVI The shun hook. XVII. The Aspirate. XVIII. Upward and Downward r.XIX. Upward and downward l and sh. XX. Compound consonants XXI. Vowel indication.</p>	12 hours
<p>Unit C XXII. The halving principle (section 1). XXIII. The halving principle (section 2). XXIV. The Doubling principle. XXV. Diphonic or two vowel signs. XXVI. Medial semicircle. XXVII. Prefixes negative words. XXVIII. Suffixes and terminations. XXIX. Contractions. XXX. Figures, etc .proper names.</p>	11 hours
<p>Unit D XXXI. Note taking, transcription, etc. XXXII. Essentials vowels. XXXIII. Special contractions. XXXIV. Advanced pharseography. XXXV. Intersections. XXXVI. Business phrases. XXXVIII. Banking and stockbroking phrases. XXXIX. Insurance and shipping phrases. XL. Technical and railway phrases. XLI. Legal phrases. XLIII. Special list of words. XLIV. Shorthand in practice.</p>	10 hours
Total	45 hours

Text Book:

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Pitman. *Pitman Shorthand Instructor and Key*, New Delhi: Pearson publisher. 2001.

Course Title: Environmental Ecology lab

Paper Code: EVS107

L	T	P	Credits	Marks
0	0	4	2	50

Practicals/ Assignments:

1. Determination of requisite size of the quadrat for vegetation analysis.
2. Analysis of frequency distribution of plants in a piece of vegetation by quadrat method.
3. To determine chlorophyll content of the given plant material.
4. To determine basal cover of trees in a forest ecosystem/forest plantation.
5. Quantitative analysis of soil organic carbon.
6. Quantitative analysis of soil pH.
7. To study pore space, water holding capacity and bulk density of soil.
8. Identification of rocks and minerals on the basis of physical characters.
9. Temporary wet amount technique for the observation of living organism.
10. Ecological comments on charts/material/fresh plant material (as per syllabus).
11. Comments on economic uses of plant material (as per syllabus).
12. Preparation of field report based on the survey of local flora.
13. Study of centre of diversity of plants from maps.
14. Comments on life cycle of some economically important insects.
15. Identification of museum specimens of some economically important fishes.
16. Study of flora and fauna through charts and maps.

References:

1. Botkin, DB, and Keller EA. *Environment Science: Earth as a living planet*. Third Edition. John Wiley and Sons Inc., 2000.
2. Muller-Dombois, D, and Ellenberg H. *Aims and Methods of Vegetation Ecology*. New York: Wiley, 1974.
3. Odum, EP. *Basic Ecology*. Philadelphia: Sanders, 1983.
4. Ricklefs, R. *The Ecology of Nature*. Fifth Edition. W.H. Freeman and Company, 2001.
5. Singh, KP, and Singh JS. *Tropical Ecosystems: Ecology and Management*. Lucknow: Wiley Eastern Limited, 1992.
6. Singh, JS. *Restoration of Degraded Land: Concepts and Strategies*. Meerut: Rastogi Publications, 1993.
7. Smith, RL. *Ecology and Field Biology*. New York: Harper Collins, 1996.

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Course Title: Modern Physics Lab

Paper Code: PHY156

L	T	P	Credits	Marks
0	0	4	2	50

Objective: The laboratory exercises have been so designed that the students learn to verify some of the concepts learnt in the theory courses. They are trained in carrying out precise measurements and handling sensitive equipment.

List of Experiments:

Experimental skills: General Precautions for measurements and handling of equipment, representation of measurements, Fitting of given data to a straight line, and Error analysis, Significant figures and interpretation of results

1. Determination of Planck's constant using photocell.
2. Study of SolarCell characteristics
3. To find halflife period of a given radioactive substance using GM counter
4. Study of C.R.O. as display and measuring device, Study of Sinewave, square wave signals (half wave and full wave rectification)
5. Determination of ionization potential of mercury.
6. Study of excitations of a given atom by Franck Hertz set up.
7. To determine charge to mass ratio (e/m) of an electron by Thomson method.
8. Study of Arc emission spectrum of given samples (Fe and Cu).
9. To determine the heat capacity of given materials.
10. To find conductivity of given semiconductor crystal using four probe method.
11. To determine the Hall coefficient and mobility of given semiconductors.
12. To determine the operating plateau and dead time of a given G.M. Counter.
13. To find the coefficient of thermal conductivity of a bad conductor by Lee's method.
14. To find the ionization potential of mercury using gas filled diode.
15. To determine the thermionic work function of tungsten using directly heated diode.
16. To determine the speed of light in air.
17. To study the various laws of thermal radiation.
18. To demonstrate diapaferro magnetism in an inhomogeneous magnetic field.
19. To measure the wave lengths of Balmar series of visible emission line from hydrogen.
20. To determine the electronic charge by Millikan oil drop method.

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Course Title: Plant Biology II Lab

Paper Code: BOT154

L	T	P	Credits	Marks
0	0	2	1	25

Practicals

1. Study of basic structure of different flowers
2. Studies of stamens and carpels of different flowers.
3. Morphological studies based on theoretical parts.
4. Preparation of 20 most important sources of spices and medicines. Give their local names, scientific names and families to which they belong. Mention their properties.

Suggested readings

1. Kocchar, SL. *Economic Botany of the Tropics*. 2nd edition, Delhi: Macmillan India Ltd, 1998.
2. Kohli, R, Arya, KS, Singh, PH, and Dhillon HS. *Tree Directory of Chandigarh*. New Delhi: Lovedale Educational, 1994.
3. Thakur, RS, Puri, HS, and Husain A. *Major Medicinal Plants of India*. CSIR, Lucknow: Central Institute of Medicinal and Aromatic Plants, 1989.

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Course Title: Basic Communication Skills Lab

Paper Code: ENG 152

L	T	P	Credits	Marks
0	0	2	1	25

Course Objective:

- To improve fluency in speaking English.
- To promote interactive skills through Group Discussions and role plays.

Learning Outcomes:

Unit – A Speaking/Listening	
• Movie-Clippings	10 hours
• Role Plays	10 hours
• Group Discussions	10 hours

References:

Books

1. Gangal, J. K. *A Practical Course In Spoken English*. India: Phi Private Limited, 2012. Print.
2. Kumar, Sanjay and Pushp Lata. *Communication Skills*. India: OUP, 2012. Print.

Websites

1. www.youtube.com (to download videos for panel discussions). Web.
2. www.englishforeveryone.org. Web.
3. www.talkenglish.com. Web.
4. www.mindtools.com. Web.

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Course Title: Stenography Lab

Paper Code: SGS105

L	T	P	Credits	Marks
0	0	1	1	25

Course Objective: The course is to inculcate writing and listening skills among the students. This would act as building blocks for the learner to begin the study of stenography. As the learners are from the senior secondary background the course has been created keeping in mind their requirements for the future.

Learning Outcome:

After going through this course the participant would have understood the basic concepts of typing and would be able to apply them in daily life. Completion of the course will improve their speed of typing and typing skills.

Unit A Beginner : Basics-fjdk, sla;,gnty,vmbn,ruei,woqp,cx. .	04 hours
Unit B Shift keys, numeric pad, Digits and symbols	03 hours
Unit C Intermediate- Syllables and words.	04 hours
Unit D Expert- Paragraphs and Stories	04 hours
Total	15 hours

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Course Title: Environmental Pollution

Paper Code: EVS201

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: Environmental pollution end results in adverse effect on the health of the people exposed to it. A large number of diseases are caused and spread by contaminated soil, water and air. The paper will deal with the impact of environmental pollution on health and includes the guidelines for pollution control in the context of public health.

Learning outcome: Having studied pollution from all its angles, the students will be better-equipped to check it and generate awareness about it among the masses.

Unit 1: Air Pollution

Environmental Components: Structure and composition of the, Atmosphere, hydrosphere, biosphere and Lithosphere; Air: Natural and anthropogenic sources of pollution. Primary and Secondary Pollutants. Transport and diffusion of pollutants. Methods of monitoring of air pollution SO₂, NO_x, CO, SPM. Effects of pollutants on human beings, plants animals, materials and on climate. Acid rain, Air quality standards; Noise: Sources of noise pollution, measurement of noise and indices, effect of meteorological parameters on noise propagation. Impact of noise on human health. Noise control and abatement measures. Noise exposure levels and standards.

(13 lectures)

Unit 2: Water Pollution

Water: Types, sources and consequences of water pollution. Physico-chemical and bacteriological sampling and analysis of water quality. Water quality standards; Marine: Sources of marine pollution and control. Criteria employed for disposal of pollutants in marine system – coastal management.

(8 lectures)

Unit 3: Soil pollution

Physico-chemical properties of soil, sampling and analysis of soil quality. Soil micro-organisms and their functions; Industrial waste effluents and heavy metals, their interactions with soil components; Different kinds of synthetic fertilizers and their interactions with different components of the soil. Degradation of different pesticides in soil. Control of Soil Pollution; Phytoremediation, techniques. (12 lectures)

Unit 4: Biological and Microbial Pollution

Bio-pollutants- seeds, spores, bacteria, viruses, trichomes. Biological warfare, Agricultural, Environmental and Human health hazards of *Parthenium*, *Ageratum* and *Lantana* weeds; Microbial Pollutants and Sanitation: Bacterial, Viral, Mycoplamic pollutants interfering biological processes, man, plants and animals; Means of safety against them; Sanitation and Hygiene. (12 lectures)

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References:

1. Botkin, DB, and Keller EA. *Environmental Science: Earth as a Living Planet*. USA: John Wiley & Sons, 2007.
2. Cunningham, W P, and Cunningham MA. *Principles of Environment Science*. Enquiry and Applications. 2nd ed, New Delhi: Tata McGraw Hill, 2004.
3. Cutler, SL. *Environment Risks and Hazard*. Delhi: Prentice Hall of India, 1999.
4. De, AK. *Environmental Chemistry*. New Delhi: New Age International (P) Ltd. Publishers, 2000.
5. Enger, ED, and Smith BF. *Environmental Science: A Study of Interrelationships*. 11th ed. USA: McGraw Hill Inc, 2006.
6. Hammer, MJ, and Hammer MJ Jr. *Water & Waste Water Technology*. Prentice Hall, 2000.
7. Kapoor, BS. *Environmental Sanitation*. New Delhi: S. Chand & Sons, 2000.
8. Raven, PH, Berg, L R, and Hassenzahl DM. *Environment*. 6th ed. USA: John Wiley & Sons, 2008.
9. Sanai, VS. *Fundamentals of Soil*. New Delhi: Kalayani Publishers, 1990.
10. Sharma, BK. *Environmental Chemistry*. Meerut: Goel Publishing House, 2000.
11. Sharma, PD. *Ecology and Environment*. New Delhi: Rastogi Publications, 1997.
12. Singh, HP, Batish, DR, and Kohli, RK. *Handbook of Sustainable Weed Management*. USA: Haworth Press Inc., 2006.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Chemistry
Paper Code: EVS 202

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: The course introduces the students to some basic chemistry relevant to the course, and to the general chemistry of the lithosphere, hydrosphere and atmosphere. Emphasis is also placed on understanding the chemistry of various anthropogenic pollutants and basic analytical techniques.

Learning outcomes: Equipped with the understanding the chemistry of atmosphere, hydrosphere and lithosphere, students will contribute towards the conservation of environment from anthropogenic pollutants.

Unit-1 Fundamental of Environmental chemistry

Elements and compounds, Atomic structure, Formation of molecules, Solutions: normality, molality and molarity, Ionization, radicals, expressing concentrations. Concept and scope of Environmental Chemistry; acid base reactions, pH and pOH, ionic product of water, common ion effect, buffer solutions, solubility and solubility product, hydrolysis, chemical equilibrium, oxidation and reduction, chemical speciation, Chemistry of Environmental Trace Elements: Pb, As, Hg and Cd. (10 lectures)

Unit 2: Atmospheric Chemistry

Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry; Catalytic decomposition process of ozone Concept of atmospheric aerosol chemistry, Greenhouse gases. Concept of green chemistry Chemical Kinetics: Simple reaction mechanisms; Order and molecularity of chemical; Reactions; First, second and zero order reactions; Catalysis; Adsorption. (8 lectures)

Unit 3: Water Chemistry

Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; Distribution of chemical species in water; Gases, organic matter and humic matter in water. (10 lectures)

Unit 4: Soil Chemistry

Chemical & mineralogical composition of soil, Physical properties of soil – texture, bulk density, permeability; Chemical properties – cation exchange capacity, pH, macro and micro nutrients. (10 lectures)

References:

1. Bhatia, SC. *Environmental Chemistry*. New Delhi: CBS Publishers and Distributors, 2002.
2. De, A K. *Environmental Sciences*. New Delhi: Wilkey Eastern Hd, 2003.

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3. Puri, B R, Sharma, L R, and Pathima M S. *Physical Chemistry*. Jalandhar: Vistal pub and co., 2004.
4. Sharma, BK. *Instrumental Methods of Chemical Analysis*. Meerut: Geol pub House, 1990.

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DAV UNIVERSITY, JALANDHAR

Course Title: Waste Water Analysis
Course Code: EVS 203

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: To acquaint the students with latest environmental technology on how to combat with water pollution and related problems.

Possible outcome: This will assist the students for designing of wastewater treatment plant in industries.

Unit 1: Introduction and quality of sewage

Purpose and Principles of sanitation; Site for sewage treatment works; Sewerage systems : separate system, combined system, partially separate system; Quality of sewage : Physical properties: Colour, Odour, Turbidity, Temperature, Solids; Chemical properties: Hydrogen ion concentration, Dissolved oxygen, Dissolved carbon dioxide, Chlorides, Hardness, Nitrogenous wastes, Biochemical oxygen demand, Chemical oxygen demand. (Lecture 10)

Unit 2: Analysis of sewage waste

Physical tests: Color, Odor, Temperature, Turbidity; Chemical tests: Chlorine, Oil & Grease, Nitrogen, Oxygen, Hydrogen ion concentration (pH), Total Solids; Bacteriological tests: MPN, IMVIC, Population equivalent; Sewage as fertilizer. (Lecture 8)

Unit 3: Primary and Secondary treatment of sewage

Primary treatment: Screens, Grit chambers, Detritus tank, Skimming tank, Sedimentation tank, Primary clarifiers; Secondary treatment: Secondary clarifiers, Coagulation of sewage ; Aerobic Treatment : Activated sludge process, aeration tank, Step aeration, Tapered aeration, extended aeration, Advantages of activated sludge process, Disadvantages of activated sludge process, Trickling filters, Standard rate trickling filters, High capacity trickling filters.; Oxidation ponds: Action, Advantages and Disadvantages; Anaerobic treatment :Septic tank, Imhoff tank, Sludge digestion tank, Bio gas. (Lecture 10)

Unit 4: Tertiary treatment and Solid waste disposal

Chlorination; Garbage collection and removal; Garbage disposal : Controlled tipping, disposal in to sea, filling of low lying areas, incineration, mechanical compost plant, pulverization, trenching, Night soil collection and disposal. (Lecture 10)

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References:

1. Benefield, LD, Jedkins, JF Jr, and Weand B L. *Process chemistry for Water and Wastewater Treatment*. New York: Prentice Hall Inc., 1985.
2. Cornwell, DA, and Davis M. *Introduction to Environmental Engineering*. New York: McGraw-Hill, 1999.
3. Eckenfelder, WW. *Industrial Water Pollution Control*. New York: McGraw-Hill Book Company, 1989.
4. Elangovan, R, and Saseetharan MK. *Unit Operations in Environmental Engineering*. New Delhi: New Age International, 1995.
5. Fair, GM, Geyer, JC, and Okun K. *Water and Wastewater Engineering*. Vol. 2, New York: John Wiley, 1979.
6. Garg, S K. *Sewage Disposal and Air Pollution Engineering*. Delhi: Khanna Publishers, 2003.

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DAV UNIVERSITY, JALANDHAR

Course Title: Inorganic Chemistry

Paper Code: CHE253

L	T	P	Credits	Marks
4	0	0	4	100

Course Objectives:

This course is intended to learn the basic concepts of Inorganic Chemistry. The present syllabus has been framed as per the latest UGC guidelines and recent research trends in the subject. The various topics of the syllabus are grouped under different units in order to bring forth the importance of academic and laboratory skills for the undergraduate students.

Expected Prospective:

This course will equip students with the necessary chemical knowledge concerning the fundamentals in the basic areas of Inorganic chemistry. The students will be able to pursue their career objectives in advance education, in scientific research and in teaching careers following graduation in the course.

Unit 1: Atomic Structure and periodic properties

Wave mechanical model of Hydrogen atom, The de Broglie relationship, The uncertainty principle, Schrodinger wave equation and its derivation, Significance of Ψ and Ψ^2 , Quantum numbers, Normal and orthogonal wave functions, Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufbau principle and its limitations. Concept of extra stability of half and completely filled electronic configuration, Electronic configuration of elements, Penetration and shielding (The Slater's rules). The origin and distribution of the elements, The structure of the periodic table, Atomic parameters and their variation in periodic table, Electronegativity and various scales. **(12 Hours)**

Unit 2: Ionic Compounds (Bonding and structures)

Properties of ionic substances, Occurrence of ionic bonding, The radius ratio rules, Efficiency of packing, Hexagonal close packing, Cubic close packing, Structures of different crystal lattices, Sodium chloride, Cesium chloride, Wurtzite, Zinc blende, Fluorite, Rutile, Cristobalite, Nickel arsenide, Calcium carbide, Lattice energy, Born-Haber cycle, The calculations of the lattice energy on the basis of Born-Lande equation, Covalent character in predominantly ionic compounds, Imperfections of crystals, Polarizing power and polarisability of ions, Fajan's rule.

(12 Hours)

Unit 3: Covalent Bond

The Lewis theory, Valence bond theory - A mathematical approach, Resonance, Valence Shell Electron Pair Repulsion Model (VSEPR theory), Prediction of structures and variation of bond angles on the basis of VSEPR theory, Shortcomings of VSEPR theory. Concept of hybridization, Rules for obtaining hybrid orbitals, Extent of d-orbital participation in molecular bonding (SO_2 , PCl_5 , SO_3), Molecular orbital theory (LCAO method), Symmetry of molecular orbitals, Applications of MOT to homo- and hetero-nuclear diatomic molecules, Molecular orbital energy level diagrams (Be_2 , N_2 , O_2 , F_2 , NO , CO , HCl , NO_2 , BeH_2). **(12 Hours)**

Unit 4: Coordination chemistry

Werner's theory, nomenclature of coordination complexes, isomerism in coordination complexes, chelating agents, metal chelates and chelate effects, names and abbreviations of

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important ligands, polydentate ligands, polypyrazoloborates, macrocyclic ligands, macrocyclic effect, ketoenolates, troponates, tripod ligands, conformation of chelate rings, factors determining kinetic and thermodynamic stability. **(12 Hours)**

Suggested Books:

1. Shriver, D.F.C., Atkins, P.W. and Langford, C.H. *Inorganic Chemistry*, ELBS Oxford, 1991.
2. Huheey, J.E. Keiter, E.A. and Keiter, R.L. *Inorganic Chemistry*, 4th edition, Singapore: Pearson Education, 1999.
3. Lee, J.D. *Concise Inorganic Chemistry*, ELBS, Oxford, 1994.

DAV UNIVERSITY, JALANDHAR

Course Title: English
Paper Code: ENG180

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To familiarize students of non-literary programmes with some of the basics of literary studies through a critical study of the prescribed texts

Unit – A <i>Never Never Nest</i> by Cedric Mount		
• Consumerist Lifestyle		3 hours
• Bank Loans and Modern Times		3 hours
• Character Analysis		5 hours
• Stylistic Analysis		4 hours
Unit – B <i>Guide</i> by R. K. Narayana		
• Interpersonal Relationships		4 hours
• Religious Beliefs/Rituals in Rural India		4 hours
• Character Analysis		4 hours
• Stylistic Analysis		3 hour
Unit – C <i>Twelfth Night</i> by Shakespeare		
• Salient Features of Shakespearean Comedy		5 hours
• Character Analysis		5 hours
• Stylistic and Thematic Analysis		5 hours
Unit – D <i>Animal Farm</i> by George Orwell		
• Marxist Principles		5 hours
• As a Progressive Text		5 hours
• Symbolic Analysis		5 hours

Suggested Reading:

1. Falvey, Peter ,Peter Kennedy. *Learning Language Through Literature: A Sourcebook for Teachers of English in Hong Kong*. HKU: Hong Kong University Press, 1997. Print.
2. www.britishcouncil.com. Web.
3. Kumar, Sukrita Paul. *Language, Literature And Creativity*. New Delhi: Orient Blackswan Pvt Ltd, 2010. Print.

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4. Swann, Joan , Robert Pope and Ronald Carter. *Creativity in Language and Literature: The State of the Art*. USA : Palgrave MacMillan, 2011. Print.

Course Title: Animal Biology I

Paper Code: ZOO 253

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: To introduce students of environmental sciences with

UNIT-A	5 hours
<ul style="list-style-type: none">• Introduction to animal kingdom and its classification.• Salient features of invertebrates and their classification.	
UNIT-B	12 hours
<ul style="list-style-type: none">• Study of habits, habitats and economic importance of <i>Amoeba</i>, <i>Paramecium</i>, <i>Hydra</i>, <i>Sycon</i>, <i>Taeniasolium</i>, <i>Ascarislumbricoides</i>, <i>Pheretima</i>, <i>Hirudinaria</i>, <i>Palaemon</i>, <i>Periplaneta</i>, <i>Pila</i>, <i>Limax</i>, <i>Asterias</i>	
UNIT-C	10 hours
<ul style="list-style-type: none">• Structure and Function of cells and cell organelles.• Cell Division-Mitosis and Meiosis• Structure and Functions of biomolecules• Type of simple and compound tissues	
UNIT-D	7 hours
<ul style="list-style-type: none">• Laws of inheritance. Multiple allelism. Blood groups in man.• Genetic disorders in man and their inheritance	

Reference books

1. Dhama, PS, and Dhama, JK. *Invertebrate Zoology*. 5th ed. New Delhi: R. Chand & Co, 2004.
2. Kotpal, RL. *Modern Text Book of Zoology: Invertebrates*. 10th ed. Meerut: Rastogi Publications, 2012.
3. Robertis, D, and De Robertis EMF. *Cell Biology and Molecular Biology*. 8th ed. Philadelphia: Saunders and Company, 1995.
4. Gupta, PK. *Genetics*. 3rd ed. Meerut: Rastogi Pub, 1996.
5. Gupta, PK. *Cytology, Genetics and Molecular Biology*. Meerut: Rastogi Publications, 1991.
6. Powar, CB. *Cell Biology*. 3rd ed. Bombay: Himalaya Publications, 1984.
7. Strickberger. *Genetics*. Monroe W., 3rd ed., New York: Macmillan Pub, 1985.

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Course Title: Environmental Chemistry Lab

Paper Code: EVS 204

L	T	P	Credits	Marks
0	0	2	1	25

Practical:

1. Calculation of Oxidation number of Cr in $K_2Cr_2O_7$, Mn in $KMnO_4$.
2. Standardization of pH with buffer solutions (4, 7 and 9).
3. Measurement of pH of acidic and basic solution using pH meter.
4. Volumetric titration – Strong acid vs. Strong base. Calculation of end point using $V_1N_1=V_2N_2$.
5. Conductometric titration – Strong acid vs. Strong base. Calculation of end point using graph.
6. Determination of hardness of water.
7. To study soil profile.
8. To study the physical and chemical properties of soil.
9. To study moisture content of soil.
10. Assignment by teacher.

References:

1. Bhatia, S C. *Environmental Chemistry*. New Delhi: CBS Publishers and Distributors, 2002.
2. De, A K. *Environmental Sciences*. New Delhi: Wilkey Eastern Hd, 2003.
3. Puri, B R, Sharma, LR, and Pathima M S. *Physical Chemistry*. Jalandhar: Vistal pub and co, 2004.
4. Sharma, BK. *Instrumental Methods of Chemical Analysis*. Meerut: Geol pub House, 1990.

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DAV UNIVERSITY, JALANDHAR

Course Title: Waste water analysis lab
Paper Code: EVS 205

L	T	P	Credits	Marks
0	0	2	1	25

Practical:

1. Determination of pH of water sample.
2. Determination of conductivity/TDS of the water sample.
3. Determination of salinity of the water sample.
4. Determination of dissolved oxygen in water sample
5. Determination of COD and Total Organic Content.
6. Determination of BOD of wastewater.
7. Determination of Total Kjeldahl Nitrogen (TKN), ammonical nitrogen etc. in water samples.
8. Determination of fluoride content in water.
9. Determination of MPN for water samples by membrane filtration, pour plate and spread plate methods.
10. Determination of sulphate reducing bacteria in a given sample of water.

References:

1. Benefield, LD, Jenkins, J F Jr, and Weand B L. *Process chemistry for Water and Wastewater Treatment*. New York: Prentice Hall Inc., 1985.
2. Cornwell, DA, and Davis M. *Introduction to Environmental Engineering*. New York: McGraw-Hill, 1999.
3. Eckenfelder, WW. *Industrial Water Pollution Control*. New York: McGraw-Hill Book Company, 1989.
4. Elangovan, R, and Saseetharan MK. *Unit Operations in Environmental Engineering*. New Delhi: New Age International, 1995.
5. Fair, GM, Geyer, JC, and Okun K. *Water and Wastewater Engineering*. Vol. 2, New York: John Wiley, 1979.
6. Garg, S K. *Sewage Disposal and Air Pollution Engineering*. Delhi: Khanna Publishers, 2003.

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Course Title: Inorganic Chemistry Lab

Paper Code: CHE254

L	T	P	Credits	Marks
0	0	3	2	50

Course Objectives:

This course is intended to learn the basic concepts of Inorganic Chemistry Laboratory. The present syllabus has been framed as per the latest UGC guidelines and recent research trends in the subject. The various experiments have been designed to enhance laboratory skills of the undergraduate students.

Expected Prospective:

The students will be able to understand the basic objective of experiments in inorganic chemistry, properly carry out the experiments, and appropriately record and analyze the results through effective writing and oral communication skills. They will know and follow the proper procedures and regulations for safe handling and use of chemicals and solvents.

Qualitative Analysis

Identification of cations and anions in a mixture which may contain combinations of acid ions. These must contain interfering acid anions and one, the insoluble.

a) Special Tests for Mixture of anions

- I. Carbonate in the presence of sulphate.
- II. Nitrate in the presence of nitrite
- III. Nitrate in the presence of bromide and iodide.
- IV. Nitrate in the presence of chlorate.
- V. Chloride in the presence of bromide and iodide.
- VI. Chloride in the presence of bromide.
- VII. Chloride in the presence of iodide.
- VIII. Bromide and iodide in the presence of each other and of chloride.
- IX. Iodate and iodide in the presence of each other.
- X. Phosphate, arsenate and arsenite in the presence of each other.
- XI. Sulphide, sulphite, thiosulphate and sulphate in the presence of each other.
- XII. Borate in the presence of copper and barium salts.
- XIII. Oxalate in the presence of fluoride.
- XIV. Oxalate, tartrate, acetate, citrate in the presence of each other.

b) Separation and identification of cations in mixtures

- i) Separation of cations in groups.
- ii) Separation and identification of Group I, Group II (Group IIA and IIB), Group III, Group IV, Group V and Group VI cations.

Suggested Books:

1. Svehla, G. and Sivasankar, B. *Vogel's Qualitative Inorganic Analysis (revised)*, Pearson, 7th edition, 1996.
2. Bassett, R. C., Denney, G. H. and Jeffery, J. Mendham, *Vogel's Textbook of Quantitative Inorganic Analysis (revised)*, 4th edition, Orient Longman, 1978.

DAV UNIVERSITY, JALANDHAR

Course Title: Animal Biology I Lab

Paper Code: ZOO 254

L	T	P	Credits	Marks
0	0	2	1	25

Classification up to classes of the following specimens with important characters:

Protozoa :*Amoeba, Paramecium, Euglena, Volvox*

Porifera :*Sycon*

Platyhelminthes :*Fasciola, Tapeworm, Ascaris*

Annelida :*Nereis, Pheretima, Hirudinaria*

Arthropoda : Cockroach, Prawn, Scorpion

Mollusca :*Unio, Pila, Sepia*

Echinodermata :*Asterias, Echinus, Cucumaria*

Permanent slides : Simple and compound tissues, stages of Mitosis and Meiosis

DAV UNIVERSITY, JALANDHAR

Course Title: Conservation and Management of Life Support System

Paper Code: EVS206

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: This paper takes an objective view of the nature of Earth's resources, particularly the non-renewable resources, how and where they are generated, how they are extracted and used, and how these activities impact Earth's environment. It also addresses sustainability by looking into different ways of conservation and management of life support systems

Learning outcomes: The learners, at the end of the course, will be prepared to curb degradation of life support system. They will have the strategies to manage it well for the progress of the society.

Unit 1: Introduction

Concept of conservation; Why to conserve, Objectives and aims of conservation, Renewable and non-renewable resources, Policies of conservation, Priorities and National strategies of conservation. Conservation of Mineral Resources: Demographic quotient, depletion curves.

(8 lectures)

Unit 2: Conservation of Soil and Forests

Conservation of Soil: Soil health, types of soil, soil components, soil formation and reasons of soil degradation, Soil erosion and its check, Soil micro-organisms; Reclamation of Usar, Alkaline and saline soil; Conservation of Forests: Joint Forest Management, Plantation programmes in India and Conservation; Protection from fire and pests. (12 lectures)

Unit 3: Conservation of Agriculture

Conservation of Agriculture: Conservation of arable land, Conservation of crop genome, improvement of crop, strategies of conservation of crops, Environment Monitoring and Assessment. Pesticides and herbicides in crop protection, Organic, inorganic and hormonal pesticides and herbicides, Environmental hazards of pesticides and insecticides - their impact on life and life support system, Role of botanicals and natural plant products in crop protection, biological management of pests and insects, Integrated approach of pest and weed management.

(12 lectures)

Unit 4: Conservation of Wildlife, Aquatic System, Rangelands and Deserts

Wildlife Conservation: Concept of wildlife, Role of wildlife in nature, Preservation of breeding stock, artificial stocking, habitat improvement, game farming; Conservation of Aquatic System: Role and conservation of phytoplankton, autotrophs, heterotrophs, macrophytes, game animals; Conservation of Rangeland and Deserts: Concept of desertification; Priority areas for conservation at regional, national and international levels, UNCCD; Strategies for conservation of wastelands and deserts.

(15 lectures)

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References:

1. Botkin, D B, and Keller E A. *Environmental Science: Earth as a Living Planet*. 6th ed. USA: John Wiley & Sons, 2007.
2. Cunningham, W P, and Cunningham M A. *Principles of Environment Science. Enquiry and Applications*. 2nd ed. New Delhi: Tata McGraw Hill, 2004.
3. Frankel, OH, Brown, AHD, and Burdon JJ. *Conservation of Plant Biodiversity*. UK: Cambridge University Press, 1995.
4. Gadgil, M, and Rao PRS. *Nurturing Biodiversity: An Indian Agenda*. Centre for Environment Education, Ahmadabad, India, 1999.
5. Groom, MJ, Meffe, G K, and Carroll CR. *Principles of Conservation Biology*. 3rd ed. USA: Sinaeur Associates, Inc., 2005.
6. Hunter, M L, and Gibbs JP. *Fundamentals of Conservation Biology*. 3rd ed. Wiley-Blackwell, 2006.
7. Jeffries, M. *Biodiversity and Conservation*. 2nd ed. UK: Routledge, 1997.
8. Leveque, C. *Ecology: From Ecosystem to Biosphere*. USA: Science Publishers, 2003.
9. Odum, EP. *Fundamentals of Ecology*. W.B. Saunders, USA, Dehradun: Natraj Publishers, 1991.
10. Raven, P H, Berg, L R, and Hassenzahl DM. *Environment*. 6th ed. USA: John Wiley & Sons, 2008.
11. Richard, P. *Essentials of Conservation Biology*. 4th ed. USA: Sinaeur Associates, Inc., 2006.
12. Singh, HP, Batish, DR, and Kohli RK. *Handbook of Sustainable Weed Management*. USA: Haworth Press, Inc., 2006.
13. Townsend, CR. *Ecological Applications: Toward a Sustainable World*. Wiley-Blackwell, 2007.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Economics
Paper Code: EVS 207

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: Economics & ecology must be completely integrated in decision making & law making processes and there should be an effort to increase understanding of intriguing policy problems. Environmental economics makes use of ideas and tools developed in other branches of economics to make significant contribution to valuation techniques, design of policy instruments for pollution control and management of commons.

Learning outcomes: The students will be equipped to relate economics with environment and know better how to evaluate the economic value of the resources. This will help in the conservation and management of the precious natural resources.

Unit 1: Definition and Scope Environmental Economics

Introduction, Economics and Environment, Definition of Environmental Economics, Scope and Significance of Environmental Economics: Environment Inter-linkages, Market failure and externality, Accounting for the Environment, Pareto Optimality, Individual Choice vs. Social Choice. (10 lectures)

Unit 2: Resource Economics

Natural Resources: Types and classification, Economics of Natural Resources Exploitation, Uses of Environment: Use Value, Existence Value and Optional Value, Market Structure and the Exploitation of Non-Renewable Resources; Conservation of Resources: Definition and Meaning, Material Substitution, Product Life Extension, Recycling, Optimum Recycling, Waste Management. (10 lectures)

Unit 3: Environment and Sustainable Development

Environmental Costs of Economics Growth, Limits to Growth, Sustainable Development, Brundtland Commission, Sustainable Industrialization, Pollution Abatement and Control. (10 lectures)

Unit 4: Economics and Pollution Control

Basic Approach to Environmental Policy, Problem of pollution Control, Moral suasion, Direct control, Regulation, Prohibition, Pollution Tax, Effluent Charges and Subsidies, Common Effluent Treatment Plant. (15 lectures)

References:

1. Bowers, J. *Sustainability and Environmental Economics*. Singapore: Addison Weley Longman Ltd, 1997.
2. Hanley, N, Jainson, FS, and Ben W. *Environmental Economics – In Theory and Practice*. New Delhi: Macmillan India Ltd, 1999.
3. Pearce, DW, and Turner KR. *Economics of Natural Resources and the Environment*. Baltimore: The Johns Hopkins University Press, 1999.

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4. Perman, R, Yue, M, and McGillivray J. *Natural Resources and Environmental Economics*. II Edition. Singapore: Addison Weley Longman Ltd, 1997.
5. Turner, KR, Pearce, DW, and Bateman I. *Environmental Economics – An Elementary Introduction*. Baltimore: The Johns Hopkins University Press, 1993.
6. Uberoi, NK. *Environmental Management*. New Delhi: Excel Book, 2004.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Impact Assessment and Auditing

Paper Code: EVS208

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: This paper is an introduction to EIA, a systematic process that examines the environmental consequences of development actions, in advance. This process is firmly on the agenda of all environmental agencies as a result of introduction of legislations in various countries.

Learning outcome: Students will be thoroughly conversant with the environmental hazards of some industries. They will be equipped with the tools of environmental auditing also.

Unit 1: Introduction to Environmental Impact Assessment

Introduction to Environmental Impact Analysis, Environmental impact statement & environmental management plan, EIA guidelines 1994, notification of the Government of India, 2006; various appendices and forms for application, Procedure of Environmental clearance- Screening, Scoping, Public Consultation, Appraisal, Types of Project activities requiring Environmental Clearance. (10 lectures)

Unit 2: Checklist for EIA

Generic structure of EIA Document, Procedure of Public hearing, Composition of EAC, SEAC, Coastal Regulation Zone Notification, 1991, Impact assessment Methodologies Generalized approach to impact analysis and statement, Baseline information and predictions. (12 lectures)

Unit 3: Environmental Auditing

Guidelines for environmental audit & Introduction to environmental planning, Environmental Auditing Procedure, Matrix method and Batelle Method of auditing, Restoration and rehabilitation and reclamation ecology concept. (11 lectures)

Unit 4: Sustainable Development

Urban and Rural planning and land-use pattern and policy for India, Sustainable Development: The Concept and strategies of sustainable development, Economic principles, Development models, ecological economics and different methods of economic evaluation. (10 lectures)

References:

1. Bassam, NE. *Energy Plant Species: Their Use and Impact on Environment and Development*. UK: James and James, Science Publishers Ltd, 2005.
2. Coley, D. *Energy and Environment Change*. John Wiley and Sons, 2008.
3. Cutter, SL. *Environmental Risks and Hazards*. New Delhi: Prentice Hall of India, 1999.

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4. Glasson, J, Therivel, R, and Chadwick A. *Introduction to Environmental Impact Assessment*. London: Routledge, 2006.
5. Kulkarni, V, and Ramachandr TV. *Environmental Management*. New Delhi: Capitol Pub. Co., 2006.
6. Petts, J. *Handbook of Environmental Impact Assessment*. Volume 1 and 2. UK: Blackwell Publishers, 2005.
7. Quaschnig, V. *Understanding Renewable Energy Systems*. UK: Earth scan Pub Ltd, 2006.
8. Rai, GD. *Non Conventional Energy Sources*. New Delhi: Khanna Publishers, 1998.
9. Ravindranath, NH, Rao, UK, Natarajan, B, and Monga P. *Renewable Energy and Environment – A Policy Analysis of India*. New Delhi: Tata McGraw Hill, 2002.
10. Sukhatme, SP. *Solar Energy – Principles of Thermal Collection and Storage*. New Delhi: Tata McGraw Hill, 2000.

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DAV UNIVERSITY, JALANDHAR

Course Title: Indoor Pollution and Health

Paper Code: EVS209

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: Indoor pollution end results in adverse effect on the health of the people exposed to it. A large number of diseases are caused and spread by contaminated water and air. The paper will deal with the impact of indoor pollution on health and includes the guidelines for pollution control.

Learning outcomes: Having the knowledge of indoor pollution and its adverse effects, the students minimizes the health hazards with occurs due to the unawareness or negligence of the indoor pollutants

Unit 1: Indoor Pollution

Practical tips on how to save the self from self-inflicted pollution; Basics of toxicity; Problems of lifestyle based diseases; Solutions needed for safety. (5 lectures)

Unit 2: Environmental Safety, Health and Management

Definition; Need for good health; factors affecting health, types of diseases (Deficiency, infection, pollution diseases) Personal hygiene – Food (Balanced die) food habits and cleanliness, food adulterants, avoiding smoking, drugs and alcohol; Public Health: Communicable diseases, Mode of transmission (Epidemic and endemic diseases), Management of Hygiene in public places (Railway stations, Bus stands and other public places) hospitals – Nosocomial infections and hygiene in Educational institutions. (8 lectures)

Unit 3: Occupational Health and Safety

Occupational health and hazards – physical, chemical and biological hazards. Principles of ergonomics. Occupational diseases – prevention and control. Health protection measures for workers – health education – first –aid. Management of medical emergencies. (10 lectures)

Unit 4: Industrial Safety and Management techniques

Industrial Safety standards and regulations. Accidents – definition, frequency rate – prevention and control. Risk Analysis and assessment. Work study, work measurement – measurement of skills, Safety cost and expenses. Principles of functions and safety management; Safety Management System: Concepts of safety management systems. Environmental Management Systems (EMS) ISO 14000 and 14001. OSHA and NIOSH compliance, Compensation Act, Public Liability Insurance Act, Mining Act, Good Manufacturing Practices (GMP) and Good Laboratory Management Practices (GLP). (12 lectures)

References:

1. Diberardins, L J. *Handbook of Occupational Safety and Health*. New York: John Willey, 1998.

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2. Khan, MAO, and Bederka J. *Survival in Toxic Environments*. New York: Academic Press, 1974.
3. Lenihan, J, and Felcher WW. *Health and Environment and man series*. New York: Academic press, 1976.
4. Schilling, R. *Occupational Health Practice*. London: Butter Worth, 1973.
5. Scott, R M. *Basic concepts of Industrial Hygiene*. New York: Lewis Publishers, 1997.

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DAV UNIVERSITY, JALANDHAR

Course Title: Animal Biology II

Paper Code: ZOO 255

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: To introduce students of environmental sciences with

UNIT-A 2 hours

- Salient features of vertebrates and their classification

UNIT-B 12 hours

- Study of characteristic features, habits, habitats and economic importance of *Scoliodon*, *Labeo*, Frog, Toad, Garden Lizard, Wall Lizard, Snake, Crocodile, Turtle, tortoise, Pigeon, House sparrow, Crow, Vulture, Kite, Parrot, Rat, Rabbit

UNIT-C 10 hours

- Functional aspects of Digestive, respiratory, circulatory and excretory systems.

UNIT-D 10 hours

- Neural and Hormonal co-ordination
- Structure and Functions of sense organs
- Physiology of animal reproduction
- Development of frog upto three germ layers.

Reference books

1. Dhami, PS, and Dhami JK. *Chordate Zoology*, 5th ed., New Delhi: R. Chand & Co., 2006.
2. Kotpal, RL. *Text Book of Zoology- Vertebrates*. Meerut: Rastogi Publications, 2012.
3. Parker, T, and Haswell, WA. *A Text Book of Zoology Vertebrates*. 7th ed. Vol. II (eds. AJ Marshall & Williams, WD.), London: Mac Millan, 1972.
4. Guyton, AX. *Text Book of Medical Physiology*. 7th edition, Saunders Company, 1986.
5. Best, J.P. *Best and Taylor's physiological basis of medical practice*. 11th ed., William and Wilkins, 1985.
6. Hoar, WS. *General and comparative physiology, Adaptation and Environment*. 3rd ed., Cambridge University Press, 1983.
7. Rhoades, R, and Tanner GA. *Medical Physiology*. 2nd ed., Lippincott Williams and
8. Wilkins, 2003.
9. Dodson, EO. *A Text Book of Zoology*. Delhi: CBS Publishers & Distributors, 1976.

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Computer Applications
Paper Code: CSA253

L	T	P	Credits	Marks
4	0	0	3	75

Course Objective: The students will understand the fundamental concepts of Computer. In addition, they will be proficient in using office automation tools, viz. Word, PowerPoint, Excel, etc.

Unit - A

Introduction to Computer Systems

- Block diagram of a computer: basic functions of each component
- Classification of Digital computers based on size
- Uses of Computers, Operating system basics - Role of operating system
- Networks & data communication
- The uses of a network
- How networks are structured: Network topologies
- Media & hardware, Internet & online resources: How Internet works
- Features of the Internet, Accessing the Internet, Working on the Internet

Unit – B

Word Processing

- Editing and Formatting a Document, Text Formatting, Paragraph Formatting, Headers and Footers
- FIND command & REPLACE command, Checking Spelling and Grammar; On-line Spelling and Grammar correction using Auto correct
- Auto Text, Using Thesaurus, Using Clip Gallery. Inserting Graphics From files
- Working with Tables -Creating Table , Entering Text in the Table
- Changing Format of Text of cells, Changing Column width and Row height, Formatting Table Border
- Using Mail Merge - Mail Merge Procedure, Printing a document

Unit - C

Spreadsheets

- Basic Operations - Arithmetic operators, Comparison operators, Text operator & (ampersand) Reference operator
- Modifying the worksheet layout - Changing Width of Column, Changing Height of Row, Deleting Rows/Columns/Cells, Moving and copying contents of cell, Alignment of text in the cell
- Printing the workbook - Setting up Print Area, Setting up Margins,

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- Defining Header and Footer, Controlling Gridlines
- Working with functions - Date and time function, Statistical function, Financial function, Mathematical and Trigonometric functions, Lookup and Reference Functions, Data Base functions, Text function, Logical functions
 - Introduction to CHARTS - Formatting Charts
 - Working with MACRO, Importing and exporting files

Unit – D

Presentations

- Creating a presentation slide, Design Templates and Blank presentations
- Power Point standard toolbar buttons
- Working with the text in a slide, Arranging Text in Different Levels
- Changing Font, Font Size and Bold; Moving the frame and inserting clip art; Different slide layouts; Formatting the Slide Design; Work with the Slide Master; Saving the presentation
- The Auto Content Wizard; Using Existing Slides; Using the different views of a slide
- Adding Transitions and Animation, Running Slide Show

Reference Books:

1. Jain, Satish. *MSOffice*. Training Guide, Delhi: BPB Publications, 2010.
2. Shelly, GB , Cashman Thomas J, and Vermaat Misty E. *Microsoft Office Word Complete Concepts and Techniques*. New Delhi: Cengage Learning, 2007.
3. Subramanian N. *Introduction to Computers*. Noida, UP, India : Tata McGraw-Hill, 2001.
4. Cyganski D, and Orr JA. *Information Technology Inside and Outside*. New Jersey USA : Pearson Education, 2002.

DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Impact Assessment and Auditing lab

Paper Code: EVS 210

L	T	P	Credits	Marks
0	0	2	1	25

Practical/ Assignments:

1. Perform EIA on: dam / air post / Industry / Bridge / railway tract/ urban city.
2. Prepare an environmental audit of hostel / institute / industrial area /city / suburbs.
3. Prepare a strategy for restoration of a degraded forest ecosystem
4. Illustrate a poorly-managed and well-managed ecosystem in your area/ locality.
5. Illustrate a land use pattern for a wasteland / roadsides / roundabouts. Prepare a model showing sustainable development in a man-made ecosystem.
6. Collect a baseline data on vegetation in over-grazed grassland disturbed ecosystem.
7. Assignment by teacher.

References:

1. Bassam, NE. *Energy Plant Species: Their Use and Impact on Environment and Development*. UK: James and James, Science Publishers Ltd, 2005.
2. Coley, D. *Energy and Environment Change*. John Wiley and Sons, 2008.
3. Cutter, SL. *Environmental Risks and Hazards*. New Delhi: Prentice Hall of India, 1999.
4. Glasson, J, Therivel, R, and Chadwick A. *Introduction to Environmental Impact Assessment*. London: Routledge, 2006.
5. Kulkarni, V, and Ramachandr TV. *Environmental Management*. New Delhi: Capitol Pub. Co, 2006.
6. Petts, J. *Handbook of Environmental Impact Assessment*. Volume 1 and 2. UK: Blackwell Publishers, 2005.
7. Quaschnig, V. *Understanding Renewable Energy Systems*. UK: Earth scan Pub Ltd, 2006.
8. Rai, GD. *Non Conventional Energy Sources*. New Delhi: Khanna Publishers, 1998.
9. Ravindranath, NH, Rao, UK, Natarajan, B, and Monga P. *Renewable Energy and Environment – A Policy Analysis of India*. New Delhi: Tata McGraw Hill, 2002.
10. Sukhatme, SP. *Solar Energy – Principles of Thermal Collection and Storage*. New Delhi: Tata McGraw Hill, 2000.

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DAV UNIVERSITY, JALANDHAR

Course Title: Indoor Pollution and Health Lab
Paper Code: EVS 211

L	T	P	Credits	Marks
0	0	2	1	25

Practical/ Assignments:

1. To study SPM in house by high volume sampler.
2. Determination of alkalinity of household waste.
3. Determination of hardness of water.
4. Determination of DO in drinking water.
5. To determine TDS in drinking water.
6. To study SPM in nearby area.
7. Analysis of SO₂ and NO_x by wet chemistry method.
8. To study the effects of SO₂ on plant.
9. To study the effects of H₂S on plant.
10. To study noise pollution using noise level meter.
11. Prepare list of plants that grow in house and community.
12. Assignment by teacher.

References:

1. Diberardins, L J. *Handbook of Occupational Safety and Health*. New York: John Willey, 1998.
2. Khan, MAO, and Bederka J. *Survival in Toxic Environments*. New York: Academic Press, 1974.
3. Lenihan, J, and Felcher WW. *Health and Environment and man series*. New York: Academic press, 1976.
4. Schilling, R. *Occupational Health Practice*. London: Butter Worth, 1973.
5. Scott, R M. *Basic concepts of Industrial Hygiene*. New York: Lewis Publishers, 1997.

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DAV UNIVERSITY, JALANDHAR

Course Title: Basic Computer Applications Laboratory

Paper Code: CSA254

L	T	P	Credits	Marks
0	0	2	1	25

- The laboratory will comprise of using commands and tools available in MS Word, PowerPoint, and Excel.
- Assignments based on the applications of above mentioned software packages.

DAV UNIVERSITY, JALANDHAR

Course Title: Animal Biology II Lab
Paper Code: ZOO 256

L	T	P	Credits	Marks
0	0	2	1	25

Classification up to classes of the following specimens with important characters:

Hemichordata:	<i>Balanoglossus</i>
Urochordata:	<i>Herdmania</i>
Cephalochordata:	<i>Branchiostoma</i>
Cyclostomata :	<i>Petromyzon</i>
Chondrichthyes :	<i>Scoliodon</i>
Osteichthyes :	<i>Labeo</i>
Amphibia :	Frog and Toad
Reptilia :	Wall lizard, Garden lizard, Python, Cobra, Krait and Viper
Aves:	Pigeon, House sparrow, Crow, Vulture, Kite, Parrot, Rat, Rabbit
Mammalia:	Rabbit
Dissections:	Rat (digestive, circulatory, reproductive systems)
Skeleton:	Rabbit

DAV UNIVERSITY, JALANDHAR

Course Title: Basic Elements and Tools of Statistics

Paper Code: EVS301

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: The paper introduces the student to the concept of statistics, modelling and simulations as well as computational techniques. These concepts are used to model various environmental systems, particularly those dealing with ecology and ecosystems and study of environmental pollution in modelling air and water quality.

Learning outcomes: The course will enable the students to spread awareness among the masses about the importance of environment for sustainable development.

Unit 1: Basic Statistics

Objectives and applications in environmental sciences; Collection, compilations and presentation of data; Basic tools of statistical analysis; Central tendency: mean (arithmetic, geometric and harmonic), median and mode; Measures of variation (standard deviation and standard error); Probability; Distribution – Normal, t and chi square, Poisson and binomial; Moments, matrices, simultaneous linear equations. (15 lectures)

Unit 2: Statistical Tests

Tests for comparing means of one and two-samples; Analysis of Variance (one-way); Multiple comparisons: Duncan's multiple range test, Tukey's test, and Dunnett's test; Tests of hypothesis and significance (Null hypothesis); Regression Analysis; Chi square test. (12 lectures)

Unit 3: Environmental system analysis

Approaches to the development of models; linear and simple regression models; validation and forecasting. (10 lectures)

Unit 4: Models of Population and Pollution

Lotka-Volterra model, Leslie's matrix model, Point source stream pollution model, Box model, Gaussian plume model. (9 lectures)

References:

1. Aggarwal, YP. *Statistical Methods – Concepts, Applications and Computations*. Bangalore: Sterling Publications Pvt. Ltd., 1986.
2. Bailey, NTJ. *Statistical Methods in Biology*. 3rd ed. UK: Cambridge University Press, Cambridge, 1994.
3. Banerjee, PK. *Introduction to Biostatistics*. New Delhi: S. Chand and Co., 2004.
4. Dobbs, S, and Miller J. *Statistics*. Cambridge, UK: Cambridge University Press, 2006.
5. Gerstman, BB. *Basic Biostatistics – Statistics for Public Health Practice*. UK: Janes and Bartlett Pub, 2008.

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6. Kothari, CR. *Research Methodology – Methods and Techniques*. 2nd revised ed. New Delhi: New Age International (P) Ltd. Publishers, 2007.
7. McKillup, S. *Statistics Explained. An Introductory Guide for Life Scientists*. Cambridge, UK: Cambridge University Press, 2006.
8. Selvin, S. *Biostatistics – How it Works. First Impression*. New Delhi: Pearson Education Inc., 2007.

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DAV UNIVERSITY, JALANDHAR

Course Title: Disaster Management
Paper Code: EVS 302

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This paper introduces the students to various environmental hazards, their causes, nature, preparedness and assessment of loss. It teaches them to model hazards and familiarizes them with methods of disaster management.

Learning outcomes: At the end of the course, the students will be able to help themselves, their work places and other organizations to counter disasters of all kinds with minimum damage to life and property.

Unit 1: Introduction to Disasters

Introduction, Types of natural calamities, major and minor calamities, impact of calamities. Concept of hazard, disaster, risk, vulnerability, exposure and response. Distinction between natural hazards and anthropogenic environmental disturbances, Hybrid hazards; Environmental Hazards: Classification, Causes and Distribution. (12 lectures)

Unit 2: Types of Disasters

Geological Hazards: Earthquakes, Volcanoes, Mass-movement; Tsunami. Hydrological Hazards: Floods, Droughts, Water Quality, Contamination, Arsenic problem, Cyclones, Hurricanes Atmospheric/Climatic Hazards: Extreme weather events, Global Climatic change. Man made Hazards: Wars, Biological war (introduction of pathogens), misuse of atomic bombs, major accidents from industries; Biophysical Hazards: Frost Hazards in agriculture, epidemics, wildfires Technological Hazards: Nature and significance. Lessons from Bhopal and Chernobyl disasters. (12 lectures)

Unit3: Management of disasters

Disaster Impacts and response – Identification of dead – Search rescue –first and relief phase Vaccination, basic sanitation and personal hygiene. Disasters and Hazard Management: Human and ecological impacts; Risk assessment and vulnerability analysis; National preparedness and adaptation strategies; Hazards policies and agencies; Land use classification. Role of GIS and remote sensing in surveillance, monitoring, risk assessment, estimation of losses and planning. (13 lectures)

Unit 4: Environmental Disaster Assessment

Planning, mitigation program, preparedness, resettlement rehabilitation, role of NGOS, Psychotherapy – simplified yoga and meditation, stress management. (10 lectures)

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References:

1. Bell, FG, and Spon FN. *Geological Hazards: Their Assessment, Avoidance and Mitigation*. e Books der ULB Darmstadt, 1999.
2. Henry, JG, and Heinke GW. *Environmental Science and engineering*. Delhi, India: Pearson education, 2004.
3. Keith, S. *Environmental Hazards: Assessing Risk and Reducing Disaster*. Routledge, 2001.
4. Keller, EA. *Introduction to Environmental Geology*. New Jersey: Prentice Hall, Upper Saddle River, 1996.
5. *Natural disasters. A guide for relief workers* – JAC Adhyatma Sadhema, Kendra Mehrani, New Delhi, 1980.
6. Singh, S, Kundan, SC, and Singh S. *Disaster Management*. New Delhi: Mittal Publications, 1998.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Geography
Course Code: EVS303

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: To acquaint the students with latest environmental technology on how to combat with water pollution and related problems.

Possible outcome: The perspective for research of students will increase in field of geography.

Unit 1: Physical basis of geography

Origin of the solar system and earth; Interior of the earth; Rocks: origin and classification; Earth's movements; Temperature of the Atmosphere-Insolation – heating of the atmosphere – Horizontal distribution of temperature and pressure – Elnino phenomenon. (Lecture 10)

Unit 2: Hydrosphere and lithosphere

Hydrosphere; Movements of ocean - waves, currents, tides, drifts and creep; Theories on origin of ocean basin, Physical properties of sea water: temperature and salinity; Ocean currents; Tides and Coral reefs; Lithosphere - layers of earth – Soil formation; soil profile; weathering of rocks; Minerals and rocks; Types of rocks. (Lecture 12)

Unit 3: Geological Hazards

Earthquakes: Causes, geological effects and their measurement, distribution of earthquake belts; Volcanoes: Types, causes and geological effects, distribution of volcanic belts; Relationship of earthquakes with volcanic belts; Weathering and erosion; Soil, soil formation, soil profile and soil type; Geological time scale; Major events in the earth's history.(Lecture 13)

Unit 4: Biogeography

Biosphere: Climate, soil, plants and animals; Zoogeography: Beginning zoogeography and its realms;Phytogeographical realms: biomes (Grass land, Tropical rain forest and Tundra); phytogeography and biogeography of INDIA. (Lecture 10)

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References:

1. Brown, JH, and Lomolino MV. *Biogeography*. Sunderland, Massachusetts: Sinauer Associates Inc., 1998.
2. Cox, CB, and Moore PD. *Biogeography – An Ecological and Evolutionary Approach*. London: Blackwell Scientific Ltd, 2000.
3. De Blij, HJ, and Peter OM. *Physical Geography of the Environment*. Brisbane: John Willey and sons, Inc., 1993.
4. Edward, A K. *Environmental Geology*. 3rd Edition. Charles E. Merrill Pub. Co. Ohio, 1981.
5. Gupta, D A, and Kapoor A N. *Principles of Physical Geography*. New Delhi: S. Chand and Company, 1986.
6. Strahler, and Strahler. *Environmental Geology*. New York: Willey and Sons, 1970.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environment Monitoring and Assessment
Paper Code: EVS 304

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: This paper is an introduction to environment monitoring and assessment a systematic process that examines the environmental consequences of development actions, in advance. This process is firmly on the agenda of all environmental agencies as a result of introduction of legislations in various countries.

Learning outcomes: Equipped with the best techniques of monitoring and assessing environment, the students will contribute towards its conservation, protection and preservation.

Unit 1: Water Monitoring and Assessment

Water sampling: Sampling stations-Collection of water samples-Handling and Preservation. Water analysis: Physical parameters: Colour, Temperature, Transparency, Turbidity; Chemical parameters: pH, Electrical conductivity, Total solids, Total suspended solids, Dissolved oxygen, Carbonates, bicarbonates, Hardness, Calcium, Magnesium, Total alkalinity, Fluoride, Iron, Nitrate, nitrite, Phosphate Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand(COD); Biological Parameters:Macrophytes, Phytoplankton, Zooplankton, Primary Productivity Bacteriological measurements. (14 lectures)

Unit 2: Soil Monitoring

Soil Analysis: Physical parameters: Density-Specific gravity-Texture Chemical Parameters: pH-Electrical conductivity-Total Alkalinity-Chloride-Nitrates-Phosphate-Iron-organic matter Biological parameters: Animal population-Benthos-Bacteria. (10 lectures)

Unit 3: Air Monitoring

Air Analysis: Physical parameters: Wind velocity-Atmospheric pressure- Temperature-Humidity Chemical Parameters: Carbon dioxide- Carbon monoxide-Sulphur dioxide-Nitrogen oxide. (10 lectures)

Unit 4: Remote Sensing

Remote sensing: Principle – Types GIS-Components-Types of maps-Digitizer-Scanner-Scale of measurements. (7 lectures)

References:

1. Rao, CS. *Environmental Pollution Control Engineering*. New Delhi: Wiley Eastern Limited New Age International Limited, 2002.
2. Saxena, MM. *Environmental analysis-Water, soil and air*. India: Agro Botanical Publishers, 1987.

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DAV UNIVERSITY, JALANDHAR

Course Title: Physical Chemistry

Paper Code: CHE353

L	T	P	Credits	Marks
4	0	0	4	100

Course Objectives:

This course is intended to learn the basic concepts of Physical Chemistry. The present syllabus has been framed as per the latest UGC guidelines and recent research trends in the subject. The various topics of the syllabus are grouped under different units in order to bring forth the importance of academic and laboratory skills for the undergraduate students.

Expected Prospective:

This course will equip students with the necessary chemical knowledge concerning the fundamentals in the basic areas of physical chemistry. The students will be able to pursue their career objectives in advance education, in scientific research and in teaching careers following graduation in the course.

Unit 1: Chemical Thermodynamics

Objectives and limitations of Chemical Thermodynamics, State functions, thermodynamic equilibrium, work, heat, internal energy, enthalpy.

First Law of Thermodynamics: First law of thermodynamics for open, closed and isolated systems. Reversible isothermal and adiabatic expansion/compression of an ideal gas. Irreversible isothermal and adiabatic expansion, Enthalpy change and its measurement, standard heats of formation and absolute enthalpies. Kirchoff's equation.

Second and Third Law: Various statements of the second law of thermodynamics. Efficiency of a cyclic process (Carnot's cycle), Entropy, Entropy changes of an ideal gas with changes in P, V, and T, Free energy and work functions, Gibbs-Helmholtz Equation., Criteria of spontaneity in terms of changes in free energy, Third law of thermodynamics, Absolute entropies. **(15Hours)**

Unit 2: Chemical Equilibrium

General characteristics of chemical equilibrium, thermodynamic derivation of the law of chemical equilibrium, Van't Hoff reaction isotherm. Relation between K_p , K_c and K_x . Temperature dependence of equilibrium constant-Van't Hoff equation, homogeneous & heterogeneous equilibrium, Le Chetalier's principle. **(05Hours)**

Unit 3: Chemical Kinetics

Rates of reactions, rate constant, order and molecularity of reactions. Chemical Kinetics: Differential rate law and integrated rate expressions for zero, first, second and third order reactions. Half-lifetime of a reaction, Methods for determining order of reaction, Effect of temperature on reaction rate and the concept of activation energy, Reaction mechanism, Steady state hypothesis

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Catalysis: Homogeneous catalysis, Acid-base catalysis and enzyme catalysis (Michaelis-Menten equation). Heterogeneous catalysis, Unimolecular surface reactions.
(15Hours)

Unit 4: Electro-Chemistry

Specific conductance, molar conductance and their dependence on electrolyte concentration, Ionic Equilibria and conductance, Essential postulates of the Debye-Huckel theory of strong electrolytes, Mean ionic activity coefficient and ionic strength, Transport number and its relation to ionic conductance and ionic mobility, Conductometric titrations, pH scale, Buffer solutions, salt hydrolysis, Acid-base indicators. **(5Hours)**

Electrochemical cells

Distinction between electrolytic and electrochemical cells, Standard EMF and electrode potential, Types of electrodes, Reference electrode, Calculation of ΔG , ΔH , ΔS and equilibrium constant from EMF data, Potentiometric determination of pH, Potentiometric titrations. **(5Hours)**

Suggested Books:

1. Atkins, P.W. *Physical Chemistry*, Oxford University Press, 8th edition, 2006 (Indian Print).
2. Engel, T. and Reid, P. *Physical Chemistry*, Pearson Education, 1st edition, 2006.
3. Castellan, G. W. *Physical Chemistry*, Wiley/Narosa, 3rd edition, 1985 (Indian Print).
4. Barrow, G. M. *Physical Chemistry*, New York: McGraw Hill, 6th edition, 1996.
5. Silbey, R. J., Albert, R. A. and Bawendi, Mounji G. *Physical Chemistry*, 4th edition, New York: John Wiley, 2005.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Geography lab

Paper Code: EVS305

L	T	P	Credits	Marks
0	0	4	2	50

Practical/ Assignments:

1. Elements of map reading.
2. Interpretation of toposheets.
3. Study of important geomorphological models.
4. Study of internal structure of earth.
5. Reading topographical maps of the Survey of India.
6. Mapping of earthquake prone areas.
7. Mapping of volcanic regions on earth.
8. Mapping of distribution and type of major rocks.
9. Elementary study of aerial photographs.
10. Microscopic study of different rocks.

References:

1. De Blij, HJ, and Peter OM. *Physical Geography of the Environment*. Brisbane: John Willey and sons, Inc., 1993.
2. Edward, AK. *Environmental Geology*. 3rd Edition. Charles E. Merrill Pub. Co. Ohio, 1981.
3. Gupta, D A, and Kapoor AN. *Principles of Physical Geography*. New Delhi: S. Chand and Company, 1986.
4. Strahler, and Strahler. *Environmental Geology*. New York: Willey and Sons, 1970.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environment Monitoring and Assessment
lab

Paper Code: EVS 306

L	T	P	Credits	Marks
0	0	4	2	50

Practical/ Assignments:

1. To study the different methods of air monitoring.
2. To study the different methods of water sampling.
3. To study the different methods of soil sediment analysis.
4. To study the Impact of Urban air pollution.
5. A visit to nearby Sewage Treatment Plant.
6. A visit to nearby Effluent Treatment Plant.
7. Analysis of industrial effluents from nearby industries.
8. To workout the economics and management of Common Effluent Treatment Plant

References:

1. Rao, CS. *Environmental Pollution Control Engineering*. New Delhi: Wiley Eastern Limited New Age International Limited, 2002.
2. Saxena, MM. *Environmental analysis-Water, soil and air*. India: Agro Botanical Publishers, 1987.

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DAV UNIVERSITY, JALANDHAR

Course Title: Physical Chemistry Lab

Paper Code: CHE354

L	T	P	Credits	Marks
0	0	3	2	50

Course Objectives:

To teach the fundamental concepts of Physical Chemistry and their applications. The syllabus pertaining to B.Sc. (Other branches.) in the subject of Chemistry has been upgraded as per provision of the UGC module and demand of the academic environment. The syllabus contents are duly arranged unit wise and contents are included in such a manner so that due importance is given to requisite intellectual and laboratory skills.

Expected Prospective:

The students will be able to understand the basic objective of experiments in organic chemistry, properly carry out the experiments, and appropriately record and analyze the results through effective writing and oral communication skills. They will know and follow the proper procedures and regulations for safe handling and use of chemicals and solvents.

1. Treatment of experimental data

Recording of experimental data. Significant number, accuracy and precision, error analysis.

2. Liquids and Solutions

- (i) To determine relative viscosities of aqueous solutions of glycerol at different concentrations.
- (ii) Calculate partial molar volume of glycerol at infinite dilution from density measurement.
- (ii) To determine viscosity-average molecular weight, number-average molecular weight and mean diameter of polyvinyl alcohol molecule from intrinsic viscosity data.

3. Thermochemistry

- (i) To determine heat capacity of a calorimeter and heat of solution of a given solid compound.
- (ii) To determine heat of solution of Solid calcium chloride and calculate lattice energy of calcium chloride using Born-Haber cycle.
- (iii) To determine heat of hydration of copper sulphate.

4. Distribution Law

- (i) To determine distribution (i.e. partition) coefficient of a solute between water and a non-aqueous solvent.

5. Surface Phenomena

To study the adsorption of acetic acid/oxalic acid from aqueous solution on charcoal. Verify Freundlich and Langmuir adsorption isotherms.

6. Colorimetry

- (i) To verify Lambert-Beer law.

7. pH-metry

- (i) To titrate a strong acid against a strong base pH-metrically.
- (ii) To titrate a weak acid against a strong base and determine the ionization constant of the weak acid.

Suggested Books

1. Levitt, B.P. *Findlays Practical Physical Chemistry*, London & New York: Longman

Group Ltd., 8th edition, 1978.

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2. Khosla, B.D., Garg, V.C. and Gulati, A. *Senior Practical Physical Chemistry*, New Delhi: R. Chand & Co., 11th edition, 2002.
3. Das, R.C. and Behra, B. *Experimental Physical Chemistry*, Tata McGraw Hill Publishing Co. Ltd. 1983.
4. *Vogel's Textbook of Quantitative Chemical Analysis* (revised by Jeffery, Bassett, Mendham and Denney), ELBS, 5th edition, 1989.
5. Svehla, G. *Vogel's Qualitative Inorganic Analysis (revised)*, 6th edition, New Delhi: Orient Longman, 1987.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Analysis and Techniques

Paper Code: EVS 307

L	T	P	Credits	Marks
4	1	0	4	100

Course objective: It is a very fruitful area of study that will guide the students as to how analyse the environment.

Learning outcome: Equipped with best techniques of analyzing, the students will contribute towards the protection and conservation of environment.

Unit 1: Quantitative Analysis

Preparation of standard solution, Standard curves, Concept of accuracy, precision and error, Acid-base, complexometric, argentometric, iodo- and iodimetric, redox and coulometric titrimetry. Gravimetric analysis – total solids, suspended solids and volatile solids.

(10 Lectures)

Unit 2: Principles of Basic Environmental Techniques

pH meter, Conductivity meter, TDS meter, DO meter, Salinity meter.(8 lectures)

Unit 3: Spectrometric Analysis

U.V. spectrophotometer, Flame photometry, Atomic absorption and atomic emission spectrophotometry, mass spectrometry. (12 lectures)

Unit 4: Chromatographic Analysis

Classical chromatographic methods like Paper, TLC, Column, GC, LC, IC, HPLC, GC-MS.

(15 lectures)

References:

1. Chatwal, GR, and Anand SK. *Instrumental Methods of Chemical Analysis*. Delhi: Himalaya Publishing House, 2007.
2. De, AK. *Environmental Chemistry*. New Delhi: New Age International, 2000.
3. Eaton, AD, Clesceri, LS, Rice, EW, and Greenberg AE. *Standard methods for examination of water and wastewater*. 21st Edition. USA: American Public Health Association, American Water Worker Association, Water Environment Federation, 2005.
4. Ewing, G W. *Instrumental methods of chemical analysis*. 5th edition. USA: McGraw Hill Publications, 1985
5. Katz, M. *Methods of air sampling and analysis*. 2nd edition. USA: American Public Health Association, 1977.

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6. Murphy, WJ. *Analytical Chemistry*. USA: American Chemical Society, 1977.
7. Patnaik, P. *Handbook of environmental analysis*. USA: CRC Press, 2010.
8. Shukla, SK, and Srivastava PR. *Methodology for environmental monitoring and assessment*. New Delhi: Common wealth Publishers, 1992.
9. Skoog, DA, Holler, FL, and Crouch SR. *Principles of instrumental analysis*. USA: Thomson Brooks/Cole Publishers, 2007.
10. Svehla, G. *Vogel's qualitative inorganic analysis*. 7th Edition. USA: Prentice Hall, 1996.
11. Wiersma, G. *Environmental monitoring*. UK: CRC Press, 2004.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Microbiology and Biotechnology
Paper Code: EVS308

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: To acquaint the students with latest environmental technology on how to combat with water pollution and related problems.

Possible outcome: The perspective for research of students will increase in field of microbiology and assist the students for various techniques used in industries.

Unit 1: History of Microbiology

History and discovery of microorganisms; Microbial world: An overview of distribution, diversities, environmental relevance; Microbe in application: pollution abatement, agricultural practices, industrial production, medical and pharmaceutical uses; Prokaryotic and Eukaryotic cell Structure of bacteria, virus, fungi, yeast and Algae Growth and reproduction of bacteria and virus; Microbiology of air /soil an overview, study of microbial isolation techniques.

(Lecture 11)

Unit 2: Techniques in Microbiology

Tools in Microbiology: Basic principles of Autoclave, Hot air oven, laminar air flow; Centrifuge; Spectrophotometer; Microscopy: Bright field-phase contrast, Dark field fluorescent confocal electron microscopy; Isolation, purification and sequencing of RNA and DNA.

(Lecture 12)

Unit 3: Microbial Techniques for Waste Management

Biogas technology: Plant design, construction, operation, biogas form organic wastes, water weeds; Landfills; Biotransformation, bioconversion, bioremediation, phytoremediation; Environmental problems & Environmental monitoring through microorganism; Microbiology of water, air and soil, microbes as pathological agent in plant, animal and man; Composting and Vermicomposting.

(Lecture 13)

Unit 4: Environmental Biotechnology

The scope of environmental biotechnology; Biodegradation of macromolecules; Basic concepts of genetic engineering of plants and its applications-herbicide and stress tolerant plant; Biotechnological strategies in forestry and wasteland management. Biotechnology in biodiversity conservation: gene banks, germplasm conservation and DNA banks. Genetically modified organisms and Biosafety- a general account.

(Lecture 12)

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References:

1. Alexander, M. *Introduction to Soil Microbiology*. New Delhi: John Wiley and Sons, Inc., 1961.
2. Evans, GM, and Furlong JC. *Environmental Biotechnology. Theory and Application*. New Delhi: John Wiley and Sons, 2003.
3. Glick, BR, and Pasternak, JJ. *Molecular Biotechnology: Principles and Applications of Recombinant DNA*. Washington, DC: ASN Press, 2007.
4. James, M. *Modern Food Microbiology*. Third Edition, CBS Publishers & Distributors, 1986.
5. Manahan, SE. *Environmental Science and Technology*. New York: Lewis, 1997.
6. Metcalf and Eddy (Eds). *Wastewater Engineering: Treatment and Reuse*. New Delhi: Tata McGraw-Hill, 2003.
7. Michael, J, Pelczar, JR, and Chan NR. *Microbiology*. New Delhi: Tata McGraw Hill Edition, 1993.
8. Pelczar, M J, Chan ECS, and Krieg NR. *Microbiology-Concepts and Applications*. New Delhi: McGraw Hill Inc., 1993.
9. Taussig, M J. *Microbiology* (2nd ed.). Oxford London Blackwell Scientific Publications, 1984.
10. Tortora, GJ, Funke, BR, and Case C L. *Microbiology-An introduction* (7th ed.). Addison Wesley longman, Inc., 2001.

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DAV UNIVERSITY, JALANDHAR

Course Title: Global Environmental Issues
Paper Code: EVS 309

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: This paper introduces the students to some of the important environmental issues that have become a matter of global policy making, international negotiations and trade disputes. It will also provide an understanding of the links between environment, property regimes, trade and information economies.

Learning outcomes: So far as environmental issues are concerned, developed countries have been discriminating against developing and under-developed countries. The knowledge of global environmental issues will make them wide awake and stand up and raise their voice against such bullying.

Unit 1: Green House effect and Global warming

Green house effect: Causes, sources, impacts, consequences and remedial measures; Global warming: Global climate change definition, Concept, History, Milankovitch's theory of climate change, GHGs, Role of humans, Climatic feedback mechanism, Possible impacts of climate change, Control and consequences. (12 lectures)

Unit 2: Acid Rain and Ozone layer depletion

Acid rain; Brown haze, Photochemical smog, Nuclear winter; Ozone depletion-sources, effects, impacts and consequences; Conventions and protocols. (10 lectures)

Unit 3: Public health issues

Public Health, Sanitation and Hygiene: Epidemiological studies – descriptive and analytical markers and indicators of pollutants in the body; Water borne, air borne, vector-borne, genetic, contagious and non-contagious diseases and their management, Sanitation measures to control infectious diseases; Environmental factors of Cancer and AIDS; Environmental ethics, environment education and awareness. (12 lectures)

Unit 4: International Policies on Environmental Issues

Stockholm conference, Creation of UNEP and its role, World earth summits; Agenda 21, Montreal and Kyoto Protocols; UNFCCC, Convention on Biodiversity and Convention on Climate Change, Climate Change and Global Warming; Cartagena Protocol; IPPC ;Concept of carbon trading; carbon credits; Ecological Footprints; Carbon Footprints; Green Buildings. (12 lectures)

References:

1. Andel, J V, and Aronson J. *Restoration Ecology*. UK: The New Frontier. Blackwell, 2005.
2. Burroughs, WJ. *Climate Change: A Multidisciplinary Approach*. 2nd ed. Cambridge University Press, 2007.
3. Hardy, JT. *Climate Change: Causes, Effects, Solutions*. USA: Wiley & Sons, 2003.

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4. Harris, F. *Global Environmental Issues*. USA: Wiley & Sons, Inc., 2004.
5. Metcalfe, S, and Derwent D. *Atmospheric Pollution and Environmental Change*. A. Hodder Arnold Publications, 2005.
6. Singh, JS, Singh, SP, and Gupta SR. *Ecology, Environment and Resource Conservation*. New Delhi, India: Anamaya Publishers, 2006.
7. UNEP. *Global Environmental Outlook 3: Past, Present and Future*. Earthscan Publications, 2002.
8. Webber, R. *Communicable Diseases: Epidemiology and Control*. 2nd ed. UK: CABI, 1996.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Laws
Paper Code: EVS310

L	T	P	Credits	Marks
4	1	0	4	100

Course Objective: Environmental law is that branch of law for planetary housekeeping, protecting the planet and its people from activities that upset the earth and its life-sustaining capacities. This paper aims to understand and apply a range of regulatory instruments to preserve and protect the environment. It also emphasizes on identifying the strengths and weaknesses in law and its enforcement and develops strategies to overcome the same.

Learning outcome: The students will become more-law abiding and alert towards violation of these laws by others.

Unit 1 : Environment Protection

Introduction to environmental laws; International and national efforts for protection. Provision in constitution of India regarding Environment; Article 21, 48 A and 51 (g). (9 lectures)

Unit 2: Indian Efforts: laws and Rules

Law of Torts; Indian Penal Code, 1860; Code of Civil Procedure, 1908; Code of Criminal Procedure, 1973. Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act, 1974 as amended up-to 1988 and rules 1975; Biodiversity Act, 2002. (12 lectures)

Unit 3: Environmental Legislation

Public policy strategies in pollution control; The Environment (Protection) Act, 1986 and Rules 1986; Wildlife Protection Act, 1972 and amended 1991; Forest Conservation Act 1980; Indian Forests Act (revised) 1982; Public liability Insurance Act, 1991 and Rules 1991. (14 lectures)

Unit 4: Management and Handling Rules

Hazardous waste (Management and Handling) Rules, 1989; Bio-medical wastes (Management and Handling) Rules, 1998; Recycled Plastics (Manufacture and usage) Rule, 1999; Municipal Waste (Management and Handling) Rules, 2000; Scheme of labeling of Environmentally Friendly Products. (8 lectures)

References:

1. Jaswal, PS, and Jaswal N. *Environmental Law*. Delhi Pioneer Publications, 2003.
2. Shastri, SC. *Environmental law in India*. Lucknow: Eastern Book Co, 2008.
3. Singh, G. *Environmental law in India*. New Delhi: Macmillan India Limited, 2004.
4. Thakur, K. *Environmental Protection Law & Policy in India*. New Delhi: Deep & Deep Publications (P) Ltd., 2003.
5. Nandimath, O.V. *Handbook of Environment Decision Making in India: An EIA Model*. New Delhi: Oxford University Press, 2009.

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DAV UNIVERSITY, JALANDHAR

Course Title: Environment Analysis and Techniques lab

Paper Code: EVS 311

L	T	P	Credits	Marks
0	0	4	2	50

Practical:

1. Preparation of a standard solution in lab
2. Preparation of a standard curve
3. To analyse the moisture content of a sample using gravimetry
4. Analysis of sample using titrimetry.
5. To analyse the pH of a sample
6. To analyse the sample Using Spectrophotometry
7. To analyse the Dissolved oxygen content of a water sample.
8. To analyse the BOD of water sample.

References:

1. Chatwal, GR, and Anand SK. *Instrumental Methods of Chemical Analysis*. Delhi: Himalaya Publishing House, 2007.
2. De, AK. *Environmental Chemistry*. New Delhi: New Age International, 2000.
3. Eaton, AD, Clesceri, LS, Rice, EW, and Greenberg AE. *Standard methods for examination of water and wastewater*. 21st Edition. USA: American Public Health Association, American Water Worker Association, Water Environment Federation, 2005.
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6. Murphy, WJ. *Analytical Chemistry*. USA: American Chemical Society, 1977.
7. Patnaik, P. *Handbook of environmental analysis*. USA: CRC Press, 2010.
8. Shukla, SK, and Srivastava PR. *Methodology for environmental monitoring and assessment*. New Delhi: Common wealth Publishers, 1992.
9. Skoog, DA, Holler, FL, and Crouch SR. *Principles of instrumental analysis*. USA: Thomson Brooks/Cole Publishers, 2007.
10. Svehla, G. *Vogel's qualitative inorganic analysis*, 7th Edition, USA: Prentice Hall, 1996.
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DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Microbiology and Biotechnology lab

Paper Code: EVS312

L	T	P	Credits	Marks
0	0	4	2	50

Practical/ Assignments:

1. Principle and working of instruments in syllabus.
2. Microbial techniques: Streaking, Inoculation, Frozen Permanents, Master Plates, Minimal plates.
3. Preparation of culture media for micro organisms. Gram staining of bacteria
4. To show the presence of microorganisms around us.
5. To study areomicroflora of assigned space.
6. Isolation of root nodule bacteria.
7. Estimation of LC50 and LD50 for a given heavy metal using a suitable organisms
8. Effect of Heavy metals of seed germination.
9. Tissue culture techniques: Anther culture and stem culture
10. Survey of vermicompost unit.
11. Assignment by teacher

References:

1. Evans, GM, and Furlong JC. *Environmental Biotechnology*. Theory and Application. New Delhi: John Wiley and Sons, 2003.
2. Michael, J, Pelczar, JR, and Chan NR. *Microbiology*. New Delhi: Tata McGraw Hill Edition, 1993.
3. Pelczar, M J, Chan, ECS, and Krieg NR. *Microbiology-Concepts and Applications*. New Delhi: McGraw Hill Inc., 1993.
4. Taussig, M J. *Microbiology* (2nd ed.). Oxford London Blackwell Scientific Publications, 1984.
5. Tortora, GJ, Funke, BR, and Case C L. *Microbiology-An introduction* (7th ed.). Addison Wesley longman, Inc., 2001.

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