UPL -University of Sustainable Technology

SRICT Institute of Science & Research

# Syllabus of 1st Year M. Sc. Environmental Science


## UPL University of Sustainable Technology

## SRICT- Institute of Science & Research

**AY-2025-2026**

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research

| UPL University of Sustainable Technology, Ankleshwar | | | | |
|---|---|---|---|---|
| **SRICT-Institute of Science and Research (SRICT-ISR)** | | | | |
| **1st Year M. Sc. Environmental Science** | | | | |
| **SEM** | **TYPE OF COURSE** | **COURSE CODE** | **NAME OF SUBJECT** | **Credits** |
| 1 | **MAJOR** | ESM400-4C | Ecology & Environmental Science | **4** |
| | **MAJOR** | ESM401-4C | Water Pollution Monitoring & Management | **4** |
| | **MAJOR** | ESM402-4C | Hazardous Waste Management | **4** |
| | **MINOR** | ESE400-4C | Environmental Science Practical-I | **4** |
| | **CORE COURSE** | ESO400-4C | RP/OJT* | **6** |
| | | | Total Credits | **22** |
| 2 | **MAJOR** | ESM403-4C | Air Pollution: Quality and Control Methods | **4** |
| | **MAJOR** | ESM404-4C | Soil Pollution & Control | **4** |
| | **MAJOR** | ESM405-4C | Cleaner Production & Green Chemistry | **4** |
| | **MINOR** | ESE401-4C | Environmental Science Practical-II | **4** |
| | **CORE COURSE** | ESO401-4C | RP/OJT* | **6** |
| | | | Total Credits | **22** |

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## SRICT Institute of Science & Research

**Teaching/Exam Scheme**

**M.Sc. Sem. I**

| Sr. No. | Course Code | Category of course | Course title | Hour s Per week | | | Total con. hrs. | Credits | E | M | I | V | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | | | | | |
| 1 | ESM400-4C | Major Course | Ecology & Environmental Science | 3 | 1 | - | 4 | 4 | 50 | 50 | - | - | 100 |
| 2 | ESM401-4C | Major Course | Water Pollution Monitoring & Management | 3 | 1 | - | 4 | 4 | 50 | 50 | - | - | 100 |
| 3 | ESM402-4C | Major Course | Hazardous Waste Management | 3 | 1 | - | 4 | 4 | 50 | 50 | - | - | 100 |
| 4 | ESE400-4C | Minor Course | Environmental Science Practical-I | 0 | 0 | 8 | 8 | 4 | 50 | 50 | - | - | 100 |
| 5 | ESO400-4C | Core Course | RP/OJT* | - | - | - | - | 6 | - | - | 75 | 75 | 150 |
| | | | Total | 9 | 3 | 8 | 20 | 22 | 200 | 200 | 75 | 75 | 550 |

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code:ESM400-4C
## Course Name: Ecology & Environmental Science
## Semester: I

**W.e.f July 2025**

**Type of course:** Major

**Prerequisite:** Should have underlying knowledge of ecology and environmental Science.

**Rationale:** At the end of the course, students will have a foundational understanding of the environment, including its structure, function, and dynamics. It explores core scientific principles, chemical interactions, and ecological systems that govern environmental processes. The course equips students to critically assess and address environmental challenges.

**Teaching and Examination Scheme:**

| Credits | | | | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | Total | CCE Marks | SSE Marks | |
| 3 | 1 | - | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hours |
|---|---|---|
| | **SECTION - A** | |
| 1 | **Fundamentals of Environmental Sciences**<br>Environmental Science: Definition, Principle, Scope, Structure and function of environment. Abiotic and biotic factors: Earth as Eco-system: changes and equilibrium in system. Importance of Environmental Economics. Cost benefits analysis; Use of Natural Resources vis-à-vis sustainability. Strategies for preservation and conversation of environment. | **9** |
| 2. | **Environmental Chemistry**<br>Environmental Chemistry: concept and scope, Stoichiometry, Chemical potential, Chemical equilibria, Acid Base reactions, Solubility products, Solubility of gases in water, Gas Laws, Classification of elements. Chemical speciation. Atmosphere: Composition, Structure & Heat balance. Particles, Ions and Radicals in atmosphere. Chemical processes for formation of inorganic and | **12** |

| | | |
|---|---|---|
| | organic particulate matter, Chemistry of Air pollutants. Thermochemical and photochemical reactions in the atmosphere. | |
| 3 | **Biome and Biogeographic realm**<br>Concept of Biome; classification and distribution; Characteristics of different biomes: Tundra, Taiga, Grassland, Deciduous forest, Chapparal, Savanna, Tropical rain forest, Highland Icy Alpine biome; Biogeographic realm and provinces (ecoregions) of the world (Udvardy, 1975), Global 200 list of eco-regions identified by WWF. | **9** |
| **SECTION - B** | | |
| 4 | **Population Ecology**<br>Concept of population and population attributes, Characteristics-Population density, natality, mortality, Age Pyramids/Age distribution, Population growth forms/curves (J Shaped and S shaped curves), Population disturbance, population dispersal (migration, Immigration and emigration), population structure;- Isolation, distribution, population explosion-causes and control measures. r-selection and k-selection. Theory of island biogeography. | **9** |
| 5 | **Community Ecology**<br>Community Ecology Community ecology (types, structure, qualitative and quantitative features); Ecological succession (primary and secondary processes in successions, theories of successions, climax community and types of climax); Species interactions (Competitions, Symbiosis, Commensalism, Parasitism, Prey – predator relationships); Niche concept, key stone species, ecotone, edge effect. | **9** |
| 6 | **Ecological Factors - Climatic Factors**<br>Light - effect of light on morphology and physiology of plants, distinguishing features of Heliophytes and schiophytes. Temperature – effect of temperature on organisms, classification of vegetation: Megatherms, Microtherms, Mesotherms, Hekisotherms. Wind - Breeze, Storm, Hurricane, westerlies and easterlies, Jetstreams - Morphological and physiological effects of wind on organisms. Humidity and types of humidity – Relative humidity, specific humidity and absolute humidity, mixing ratio, dew point temperature, wet bulb temperature, effect of humidity on organisms. Precipitation- types of precipitation-convectional, orographic and cyclonic. Western disturbance, southwest monsoon and northeast monsoon. | **12** |

**Suggested Specification table with Marks (Theory):**

| Distribution of Theory Marks (%) | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **25** | **30** | **10** | **15** | **10** | **10** |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Text Books:**

1. P. D. Sharma; Ecology and Environment; Volume 22 of Popular Biology Text Books Rastogi Publications, 2007
2. Environmental Science by SC Santra, Central Publ.
3. Ecology and Environmental Science by SVS Rana, PHI pvt. ltd. 3. Fundamentals of Ecology by EP Odum, Natraj Publ.
4. Ecology and Environment by P D Sharma, Rastogi publication

**Reference Books:**

1. Stanley E. Manahan; Fundamentals of Environmental Chemistry; Publisher: CRC Press 1993.
2. Fundamentals of Ecology by Odum and Barrett, Thompson publ.
3. Fundamentals of Ecology by MC Dash, Tata Mc Graw Hill Edu Pvt Ltd
4. Environmental Science by Cunningham and Cunningham
5. Ecology: Principles and Applications by J. L. Chapman, M. J. Reiss, Cambridge University Press
6. Concepts of Ecology by EJ Kormondy, PHI
7. Sustainable Development by Kumar das, Reference Publ.
8. Ecology, Chemistry and Management of Environmental Pollution by MC Dash, Mac Milla

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Develop knowledge about the fundamentals of Environmental Sciences, understand biotic and abiotic factors of environment and environment in terms of socio economic benefits. | 15% |
| CO-2 | Understand the chemistry that binds the different layers of environment through reactions and balancing of chemical molecules. | 20% |
| CO-3 | Elaborate on the details of ecology and ecosystem. | 15% |
| CO-4 | Understand the population ecology and biogeography | 20% |
| CO-5 | Understand the community ecology and Ecological succession. | 15% |
| CO-6 | Have an in depth understanding of the concepts of ecosystem and ecological factors. | 15% |

**List of Open Source Software/learning website:**

1. https://vardhaman.org/wp-content/uploads/2021/03/ENVIRONMENTAL-SCIENCE-1.pdf
2. https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf
3. https://uou.ac.in/sites/default/files/slm/ENS-501.pdf
4. https://annamalaiuniversity.ac.in/studport/download/engg/pharm/resources/BPHARM_1Y_2S_206T_ENVIRONMENTAL%20SCIENCES.pdf
5. https://www.aumsaiengineering.co.in/Pdffiles/EVS%20Notes%20By%20Sures%20Choudhury.pdf

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESM401-4C
## Course Name: Water Pollution Monitoring & Management
## Semester: I

**w.e.f.: July 2025**

**Type of course:** Major Course

**Prerequisite:** Basic knowledge on chemistry and physics of water, ecosystem components etc.

**Rationale:** The course intends to prepare students to learn the art of water monitoring and knowledge of critical water quality parameters. It also brings in those aspects of chemistry which are important for water quality management and pollution control.

**Teaching and Examination Scheme:**

| Credits | | | | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | Total | CCE Marks | SSE Marks | |
| 3 | 1 | - | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hours |
|---|---|---|
| | **SECTION - A** | |
| **1** | **Water resources and consumption:** Use of water (domestic, agricultural, and industrial non-consumptive use); Availability of water, global water balance and hydrological cycle, Water resource development projects, Flood and drought, Ground water storage and flow, National Water Policy, Rain water harvesting, Integrated watershed management. | **9** |
| **2** | **Water pollutants:** Nature and type of water pollutants: Elemental pollution, Heavy metals, Metalloids, Organic Pollutants, Persistent organic pollutants, Pesticides in water, radioactive and thermal pollution. | **9** |
| **3** | **Water quality parameters:** Water quality parameters and its standards (DO, BOD, COD, Acidity, Alkalinity, Hardness, Residual chlorine and Chlorine demand, coliform); Deoxygenating substances, Biochemical aspects of water pollutants; Eutrophication; Soaps and Detergent. | **12** |

| SECTION - B | | |
|---|---|---|
| **4** | **Sampling Techniques:**<br>Grab and Composite Sampling Methods – Random, Systematic Stratified, Cluster - Site selection for Waste Water Sampling – Influent, Effluent, Pond and Lagoon sampling, continues monitoring of pH, Temperature, DO, Bio-Monitoring, Waste Management Approach, Energy Audit, Waste Audit, Volume and Strength Reduction – Process modification – by product recovery and ZLD. | **9** |
| **5** | **Water Pollution Control Technology-I:**<br>Wastewater: Nature and constituents, Treatment strategies. Primary Treatment: Sedimentation, Equalization Tank, Gravity settling tank, Primary and secondary clarifiers. Secondary treatment: biological tower, combined filtration and aeration processes, tapered, step and extended aeration. Tertiary treatment: Disinfection treatment processes. | **9** |
| **6** | **Water Pollution Control Technology-II:**<br>Chemical treatment processes: Coagulation, flocculation, chemical oxidation/reduction, and chemical neutralization, ozonisation, chlorination.<br>Biological Treatment measures: Dissolved oxygen, suspended solids, nutrient, alkalinity and pH, temperature, micro-organisms. Energy reactions-aerobic and anaerobic conditions. Aerobic: Nitrosobactor, thiobacillus. Anaerobic: Denitrification, phosphorous removal, sulphur reduction. | **12** |

**Suggested Specification table with Marks (Theory):**

| Distribution of Theory Marks (%) | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **25** | **30** | **10** | **15** | **10** | **10** |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Text Books:**

1. Basic concepts of Environmental chemistry, (1997) Des W Connel, Lewis publication
2. Environmental Science and Technology, (1997) Stanley. E. Manahan, Lewis Publication.
3. Water environment & Pollution, Kumar & Kakrari, Agrobios.
4. Environmental Chemistry, A. K. De.

**Reference Books:**

1. Chemistry of the Environment, Spiro, 2nd Ed., EEE
2. Biology of Freshwater Pollution Mason, C.F.,, 3rd Ed, Longman
3. Environmental Problems & Solutions, Asthana & Asthana, S. Chand
4. Metcalf & Eddy, "Wastewater Engineering Treatment disposal reuse", Tata McGraw Hill.
5. Eckenfelder, W.W., "Industrial Water Pollution Control", McGraw Hill.
6. M.N. Rao and Dutta – Industrial Waste.
7. Mark J. Hammer, Mark J. Hammer, Jr., "Water and Wastewater Technology", Prentice Hall of India.
8. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering.
9. C.G. Gurnham –Principles of Industrial Waste Engineering

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Discuss the importance of water and the challenges in the various dimensions of water. | 15% |
| CO-2 | Discuss different types of water pollutants. | 15% |
| CO-3 | Discuss water quality parameters. | 20% |
| CO-4 | Understand sampling techniques. | 15% |
| CO-5 | Understand preliminary, secondary, and tertiary wastewater treatment. | 15% |
| CO-6 | Understand chemical and biological processes in wastewater treatment. | 20% |

**List of Open Source Software/learning website:**

1. https://byjus.com/biology/water-pollution-control/
2. https://www.studocu.com/row/document/university-of-technology-jamaica/project-management/water-quality-lecture-notes-3/7446862
3. https://www.savemyexams.com/dp/environmental-systems-and-societies-ess/ib/17/sl/revision-notes/4-water-and-aquatic-food-production-systems-and-societies/4-4-water-pollution/water-pollution-management-strategies/
4. https://www.slideshare.net/slideshow/water-quality-monitoring-231010631/231010631

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESM402-4C
## Course Name: Hazardous Waste Management
## Semester: I

**w.e.f.: July 2025**

**Type of course:** Major Course

**Prerequisite:** An introductory knowledge of solid and hazardous waste along with some basic understanding of solid waste management at industries

**Rationale:** This subject is intended to make students aware about various kind of solid wastes and their general characteristics along with different technologies for treatment of these wastes. Existing legislation for municipal waste, e-waste & hazardous waste and design criteria for hazardous waste and municipal waste landfill is also an integral part of this course.

**Teaching and Examination Scheme:**

| Credits | | | | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | Total | CCE Marks | SSE Marks | |
| 3 | 1 | - | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hours |
|---|---|---|
| | **SECTION - A** | |
| **1** | **Relevant Regulations**<br>Municipal solid waste (management and handling) rules, hazardous waste (management and handling) rules, biomedical waste handling rules, flyash rules, recycled plastics usage rules, batteries (management and handling) rules. | **9** |
| **2** | **Municipal Solid Waste Management**<br>Fundamentals Sources, composition, generation rates, collection of waste, separation, transfer and transport of waste, treatment and disposal options. | **9** |
| **3** | **Hazardous Waste Management**<br>Characterization of waste, compatibility and flammability of chemicals, fate and transport of chemicals, health effects. | **12** |
| | **SECTION - B** | |
| **4** | **Radioactive Waste Management** | **9** |

| | | |
|---|---|---|
| | Sources, measures and health effects, nuclear power plants and fuel production, waste generation from nuclear power plants, disposal options. | |
| **5** | **Physicochemical Treatment of Solid and Hazardous Waste**<br>Chemical treatment processes for MSW (combustion, stabilization and solidification of hazardous wastes), physicochemical processes for hazardous wastes (soil vapour extraction, air stripping, chemical oxidation), ground water contamination and remediation. | **9** |
| **6** | **Biological Treatment of Solid and Hazardous Waste**<br>Composting; bioreactors, anaerobic decomposition of solid waste, principles of biodegradation of toxic waste, inhibition, co-metabolism, oxidative and reductive processes, slurry phase bioreactor, in-situ remediation. Landfill design: Landfill design for solid and hazardous wastes, leachate collection and removal, landfill covers, incineration. | **12** |

**Suggested Specification table with Marks (Theory):**

| **Distribution of Theory Marks (%)** | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **25** | **30** | **10** | **15** | **10** | **10** |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Text Books:**

1. N P Cheremisinoff, Butterworth-Heinemann, Handbook of Solid Waste Management and Waste Minimization Technologies, 2003.
2. F Dougal and P White, Integrated Solid waste Management, John Wiley and Sons, 2001.
3. Worrell and Vesilind, Solid waste Engineering, Cengage Learning, 2nd Ed., 2001.

**Reference Books:**

1. John Pichtel Waste Management Practices CRC Press, Taylor and Francis Group 2005.
2. LaGrega, M.D. Buckingham, P.L. and Evans, J.C. Hazardous Waste Management, McGraw Hill International Editions, New York, 1994.
3. Richard J. Watts, Hazardous Wastes - Sources, Pathways, Receptors John Wiley and Sons, New York, 1997.
4. Eckenfelder W.W. Industrial Water Pollution Control, McGraw Hill Book Company 3rd Ed, 2000.
5. Kiely G, Environmental Engineering, McGraw Hill Book Company, 1998.

6. Rao C.S., Environmental Pollution Control and Engineering, New Age International (P) Limited, 1991.
7. Besselviere, E and Schwartz, Treatment of Industrial Wastes, McGraw Hill. 1975.

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Describe proper understanding about various kind of solid wastes and their general characteristics. | 15% |
| CO-2 | Explain awareness about existing legislation for municipal waste, e-waste and hazardous waste in India. | 15% |
| CO-3 | Discuss sound knowledge of different technologies available for treatment of various solid wastes. | 20% |
| CO-4 | Discuss awareness about design criteria for hazardous waste landfill. | 15% |
| CO-5 | Discuss sound knowledge of different waste management concepts. | 15% |
| CO-6 | Discuss awareness about design criteria for of biological treatment | 20% |

**List of Open Source Software/learning website:**

1. https://www.gtu.ac.in/syllabus/NEW%20BE/Sem6/2163505.pdf
2. https://www.ddegjust.ac.in/Portal/syllabus/3_28May2024_15-23-43-24.pdf
3. https://archive.nptel.ac.in/courses/105/106/105106056/
4. https://archive.nptel.ac.in/content/storage2/courses/105106056/Introduction.pdf
5. https://igmpi.ac.in/waste-management?gad_source=1&gbraid=0AAAADsCOjWQS4Bwhx4_-jedu6K1c0C8F&gclid=Cj0KCQjw5azABhD1ARIsAA0WFUEupOmVkoRd5_nfUhRlAF8VOyIquH08xXvrRA8OcQVrOhfK4rVoEOUaAj69EALw_wcB
6. https://www.bbau.ac.in/Docs/FoundationCourse/TM/Lecture%209%20Hazardous%20waste.pdf
7. https://www.intechopen.com/chapters/74184
8. https://www.nswai.org/docs/Solid%20and%20Hazardous%20Waste%20Management%20(1).pdf

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESE400-4C
## Course Name: Practicals in Environmental Science-I
## Semester: I

**w.e.f.: July 2025**

**Type of Course:** Minor course

**Prerequisite:** Should have fundamental knowledge glassware's and apparatus used in environmental science lab.

**Rationale:** At the end of the course students will have knowledge of ecology, water pollution monitoring and hazardous waste management methods.

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | C | CCE Marks | SEE Marks | |
| - | - | 8 | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hrs. 120 |
|---|---|---|
| | **List of Practicals** | |
| | 1. To determine the pH of a given sample of hazardous waste by universal indicator method and pH meter method.<br>2. To carry out Paint Filter Liquid Test (PFLT) for a given sample of hazardous waste to check the availability free moisture.<br>3. To perform phytoplankton measurement by micrometry.<br>4. To determine the moisture content in given solid waste sample.<br>5. To Determine Loss on ignition (% organic matter) of given sample of solid waste.<br>6. To determine heavy metals (Ni, Pb and Cu) in given sample of hazardous waste through TCLP.<br>7. To prepare a case-study on latest disaster on Global.<br>8. To prepare a report on Field visits to Forests.<br>9. To prepare a report on Field visits to coastal environments and wetlands.<br>10. Estimation of Chloride in water. | **120** |

| | | |
|---|---|---|
| | 11. Estimation of hardness in water.<br>12. Estimation of alkalinity in water.<br>13. Estimation of BOD of water.<br>14. Estimation of COD of water.<br>15. Estimation of Ammonical nitrogen of water.<br>16. Estimation of DO of water.<br>17. Estimation of Oil & Grease contents of waste water.<br>18. Estimation of Heavy metal in water/soil samples using spectrophotometry.<br>19. Study of population dynamics using field data and mathematical models.<br>20. Bioassay experiments using aquatic organisms (e.g., Daphnia LC50 test).<br>21. Preparation of Herbarium sheet. | |

**Reference Books:**

1. R. K. Trivedy, P. K. Goel, C. L. Trisal., Practical Methods in Ecology and Environmental Science, 2nd Ed., Enviro Media Publications, (1987).
2. S.V.S. Rana, Essentials of ecology and environmental science, Print Book ISBN-9788120347861, PHI Learning, (2025).
3. S.K. Gupta & I.C. Gupta, water pollution and quality management theory and practicals, ISBN-9789394645127, Scientific Publishers, (2025).
4. Gary F. Lindgren, Managing Industrial Hazardous Waste-A Practical Handbook, ISBN-9781315895161, Informa UK Limited, an Informa Plc company (1989).
5. Shane S. Que, Hazardous Waste Analysis, ISBN-978-0-86587-609-5, Row Man & Littelfiled, (2000).

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Analyze data to understand ecological processes. | 10% |
| CO-2 | Able to equip students with hands-on skills in ecological research and analysis. | 20% |
| CO-3 | Identify pollutants, measure water quality parameters, analyze data. | 20% |
| CO-4 | Design effective water treatment and control strategies. | 20% |
| CO-5 | Identify, handle, and manage hazardous waste materials safely and effectively. | 10% |
| CO-6 | Acquainted with relevant regulations, choosing appropriate disposal | 20% |

| | | |
|---|---|---|
| | methods. | |

## Distribution of Practical Marks

| A Level | B Level | C Level | D Level |
|---|---|---|---|
| **10** | **15** | **15** | **10** |

**Legends:**

A= Conduction of Practical

B= Regular Record Writing

C= Viva –Voce

D= Understanding of Experiments

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research

**Teaching/Exam Scheme**

**M.Sc. Sem. II**

| Sr. No. | Course Code | Category of course | Course title | Hour s Per week | | | Total con. hrs. | Credits | E | M | I | V | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | | | | | |
| 1 | ESM403-4C | Major Course | Air Pollution: Quality and Control Methods | 3 | 1 | - | 4 | 4 | 50 | 50 | - | - | 100 |
| 2 | ESM404-4C | Major Course | Soil Pollution & Control | 3 | 1 | - | 4 | 4 | 50 | 50 | - | - | 100 |
| 3 | ESM405-4C | Major Course | Cleaner Production & Green Chemistry | 3 | 1 | - | 4 | 4 | 50 | 50 | - | - | 100 |
| 4 | ESE401-4C | Minor Course | Environmental Science Practical-II | 0 | 0 | 8 | 8 | 4 | 50 | 50 | - | - | 100 |
| 5 | ESO401-4C | Core Course | RP/OJT* | - | - | - | - | 6 | - | - | 75 | 75 | 150 |
| | | | Total | 9 | 3 | 8 | 20 | 22 | 200 | 200 | 75 | 75 | 550 |

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESM403-4C
## Course Name: Air Pollution: Quality and Control Methods
## Semester: II

**w.e.f July 2025**

**Type of course:** Major

**Prerequisite:** Basic knowledge on atmospheric composition and air quality and addressing their controls.

**Rationale:** At the end of the course, students will get familiar with Earth's atmosphere and its chemistry, the current state of atmospheric phenomena, as well as the sources and status of air pollution, and also air quality standards. Meteorology in the dispersion of the air pollutants, various dispersion models and various types of the sampling involved in testing of the pollutants. Issues related to noise pollution and their impact on the environment and health are deal with.

**Teaching and Examination Scheme:**

| Credits | | | | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | Total | CCE Marks | SSE Marks | |
| 3 | 1 | - | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hours |
|---|---|---|
| | **SECTION - A** | |
| 1 | **Atmospheric Chemistry**<br>Evolution of Earth's atmosphere; Composition and Structure of the Earth's Atmosphere, Physical properties of atmosphere: Temperature and pressure, humidity; Chemical composition of Air: Chemical speciation. Particles, ions and radicals in the atmosphere; Chemical processes in the formation of inorganic and organic particulate matters; Thermochemical and photochemical reactions in the atmosphere. | **9** |
| 2. | **Air Pollution**<br>Definition of pollution; History of air pollution; Structure of the atmosphere; Natural and man-made Air pollution; Types and sources of Air Pollution; Meteorology of air pollution: Wind speed, direction and their vertical profiles, turbulence, temperature inversion, atmospheric stability classes and | **12** |

| | | |
|---|---|---|
| | characteristic. Heat Island effects and Wind valley effect. Dispersion models; Effects of air pollution on living organisms, on plants, on the stratosphere, Effect on materials, on human health, Food production, Effect on climate, Control measures for air pollution; Air pollution in India; Air quality monitoring. | |
| 3 | **Air Pollutants**<br>Air pollution and pollutants; Classification of air pollutants: Primary air pollutants (CO, $CO_2$, $NO_x$, $SO_x$, hydrocarbons, Particulate matter) and Secondary air pollutants (Smog, PAN, $O_3$, Formaldehyde); Transport and diffusion of pollutants; Laws governing behaviour of pollutants in the atmosphere; Sinks of atmospheric gases; Fate of air pollutants; What happens to pollutants in the atmosphere: Chemical and photochemical reactions in the atmosphere; Reactions of air in stratosphere, Mesosphere and Ionosphere; Environmental factors and air pollution - heat, insulation, wind, precipitation, plume behavior; Acid deposition, Global climate change-greenhouse gases and global warming. | **9** |
| | **SECTION - B** | |
| 4 | **Air pollution control technologies**<br>Sampling and measurement of air pollution - ambient air and stack monitoring, indoor air pollution, indoor air quality, prevention and control of air pollutants (Combustion, Absorption & Adsorption); - particulate matter & gaseous pollutants – absorption, adsorption, settling chambers, fabric filters, scrubbers, cyclone & electrostatic precipitators; Clean Development Mechanisms (CDM): carbon sequestration, carbon footprint, carbon trading, carbon market; Carbon Capture and Storage; Air quality standards, Indian National Ambient Air quality standards, Air pollution index. | **9** |
| 5 | **National & International Legislations, Policies for Air pollution management**<br>Environmental policy in ancient times; The provisions for Environment in the constitution of India; Air (prevention and control of pollution) Act-1981, Powers and Functions of the Pollution Control Boards; Motor Vehicle Act-2019; Noise Pollution rules 2000; UNFCCC, IPCC; Basic objectives or salient features of different international protocols related to atmosphere (Kyoto Protocol 1997, Paris Agreement-2015; Vienna Convention-1985 and Montreal Protocol-1987). | **9** |
| 6 | **Noise Pollution and their Management**<br>Sources of noises pollution, Characteristics of sound; Noise regulation and mitigation; Monitoring and control of noise pollution, measurement of noise indices ($L_{eq}$, $L_{10}$, $L_{90}$, $L_{50}$, $L_{DN}$, TNI); Sound level meter, Loudness measurement, | **12** |

| | | |
|---|---|---|
| | Noise levels in decibel scale; Industrial noise & vibrations and its reduction approaches and Prevention; Structure of human ear and hearing mechanism, Effect of noise & vibrations on human health and Effect of noise wildlife. | |

**Suggested Specification table with Marks (Theory):**

| Distribution of Theory Marks (%) | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **25** | **30** | **10** | **15** | **10** | **10** |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Text Books:**

2. Introduction to Environmental Engineering and Science by Gilbert M. Masters, Pearson Education
3. Environmental Chemistry by A.K. Dey, New age International (P) Ltd
4. Environmental Chemistry – Sodhi
5. Environmental Protection and Laws by Jadhav and Bhosale, V. M. Himalaya publishing House.
6. Air Pollution by V.P. Kudesia Pragati Prakashan, 1997.
7. Air Pollution by M.H. Rao and H.V.H. Rao. Tata McGraw Hill Publication, 1998.
8. Air Pollution by T. Molina and C. S. P. Ojha. CRC Press, 2010.
9. Air Pollution by Sharma, B.K. Academic Press, 2002.
10. Rao, M. 2002. Air Pollution. Prentice & Hall.
11. Sharma, B.K. 2002. Air Pollution. Academic Press.

**Reference Books:**

1. Air Pollution by V.P. Kudesia, Pgagati Prakashan .
2. Noise Pollution by V.P. Kudesia, Pgagati Prakashan.
3. Environmental Radiation and Thermal Pollution by G.R. Chhatwal et al. Anmol Publications.
4. Environmental Noise Pollution and its Control G.R. Chhatwal et al. Anmol Publications.

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Comprehend the fundamental structure, function, and composition of the chemistry of Earth's atmosphere | 15% |

| | | |
|---|---|---|
| CO-2 | Recognize the sources, types, and consequences of air pollution, and it's various effects on humans as well as on ecosystem which will make them careful in future. | 20% |
| CO-3 | Understand the atmospheric phenomena of pollutants, as well as the sources and status of air pollution, and also air quality standards. | 15% |
| CO-4 | Understand the Meteorology in the dispersion of the air pollutants, various dispersion models, types of the sampling for testing of the pollutants. | 20% |
| CO-5 | Understand the importance of National & International Legislations and Air pollution management Policies. | 15% |
| CO-6 | Understand the issues related to noise pollution and their impact on the environment and health. | 15% |

**List of Open Source Software/learning website:**

1. https://aits-tpt.edu.in/wp-content/uploads/2023/09/Air-Pollution-Control-min.pdf
2. https://archive.nptel.ac.in/courses/105/107/105107213/
3. https://www.vedantu.com/biology/air-pollution-control
4. https://www.neaspec.org/sites/default/files/Air_Pollution_Handbook.pdf
5. https://www.nextias.com/blog/air-pollution/
6. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture-notes/env-health-science-students/airpollution.pdf

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESM404-4C
## Course Name: Soil Pollution & Control
## Semester: II

**w.e.f.: July 2025**

**Type of course:** Major Course

**Prerequisite:** An introductory knowledge of soil properties.

**Rationale:** At the end of the course, the students will be able to understand the physio-chemical and biological properties of soil, understand the pollution of the soil environments and their management.

**Teaching and Examination Scheme:**

| Credits | | | | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | Total | CCE Marks | SSE Marks | |
| 3 | 1 | - | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hours |
|---|---|---|
| | **SECTION - A** | |
| **1** | **Soil Structure and composition:** Soil as environmental interface; Weathering (physical, chemical and biological) of rocks and formation of soil; Soil profile or soil horizons; Chemical properties of soil: Mineral (inorganic) constituents of soil, Clay minerals, Cation exchange capacity, Soil pH (acidity, alkalinity, salinity and sodicity), Soil organic matter; Physical properties of soil (colour, textural classes, structure, particle density, bulk density, porosity); Soil water; Soil aeration and temperature; Soil classification, Soil types of India. | **9** |
| **2** | **Basics of soil pollution:** Definition, Sources, Types of soil pollution. Physicochemical and microbial Characteristics of soil pollutants. Soil pollution from Industrial Waste, Domestic Waste, Agricultural Waste and Agrochemical residues. Detrimental effects of soil pollutants. Remedial measures of soil pollution. | **9** |
| **3** | **Soil micro-organisms and their functions:** | **12** |

| | | |
|---|---|---|
| | Role of microorganisms in the biochemical cycles; N -fixation & P-solubilization; degradation of different insecticides, fungicides and weedicides in soil, residual toxicity. Losses of these substances due to volatilization, leaching and microbial immobilization, their toxicity and pollution. | |
| **SECTION - B** | | |
| **4** | **Basic principles of soil sampling:** General steps involved in soil sampling; Selection of sampling approach; Selection of monitoring equipment. Physical characterization and climatic conditions. Physico-chemical and bacteriological sampling and analysis of soil quality. Assessment of soil pollutions, international standards. | **9** |
| **5** | **Soil Pollution Control Technology-I:** Remedial measures for soil pollution. In situ and ex-situ treatment Technology. Physical/Chemical Treatment Technologies: solidification/stabilization, soil flushing, Chemical oxidation/reduction, electro- kinetic separation, pyrolysis, incineration, plasma pyrolysis | **9** |
| **6** | **Soil Pollution Control Technology-II:** Biological Treatment Technologies: Bioremediation: Bioventing, Air Sparging, Biosparging, Land treatment. Phyoremediation: Phytoextraction, Phytovolatization, Phytodegradation, Phytotransformation, Rhizosphere bioremediation. | **12** |

**Suggested Specification table with Marks (Theory):**

| **Distribution of Theory Marks (%)** | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **25** | **30** | **10** | **15** | **10** | **10** |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Text Books:**

1. G.M. Pierzynski, J. Thomas Sims and George F. Vance - Soils and Environmental Quality
2. Ibrahim A Mirsal – Soil Pollution: Origin, Monitoring and Remediation

**Reference Books:**

1. Dr. Vijendra Singh (2020), Environmental chemistry: water and soil pollution
2. Yaron. B, Calvet R, and R. Prost.- Soil Pollution: Process and Dynamics
3. Maier, Pepper & Gerba, - Environmental Microbiology
4. Subba Rao N.S., Soil Microbiology

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Understand the physio-chemical and biological properties of soil | 15% |
| CO-2 | Understand the source of the pollutants adversely affecting the properties of the soil | 15% |
| CO-3 | Understand the role of microorganisms in the biochemical cycles. | 20% |
| CO-4 | Understand the basic principles of soil sampling. | 15% |
| CO-5 | Understand the physical and chemical treatment technologies to control the soil pollution. | 15% |
| CO-6 | Understand the biological treatment technologies to control the soil pollution. | 20% |

**List of Open Source Software/learning website:**

1. https://www.ramauniversity.ac.in/online-study-material/fet/biotechnology/m.sc/ii-semester/environmentalbiotechnology/lecture-12.pdf
2. http://eagri.org/eagri50/ENVS302/pdf/lec10.pdf
3. https://testbook.com/ias-preparation/soil-pollution
4. https://byjus.com/chemistry/soil-pollution/
5. https://osou.ac.in/eresources/Soil%20Pollution.pdf

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESM405-4C
## Course Name: Cleaner Production & Green Chemistry
## Semester: II

**w.e.f.: July 2025**

**Type of course:** Major Course

**Prerequisite:** An introductory knowledge of cleaner production & green chemistry technologies.

**Rationale:** This course equips students with strategies to minimize waste and environmental impact at the source. It emphasizes designing safer chemicals, processes, and sustainable manufacturing practices. The course integrates principles of pollution prevention with innovation in chemical design. Students learn to balance efficiency, safety, and sustainability in industrial applications. This knowledge supports the transition toward a circular economy and greener industries.

**Teaching and Examination Scheme:**

| Credits | | | | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | Total | CCE Marks | SSE Marks | |
| 3 | 1 | - | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hours |
|---|---|---|
| | **SECTION - A** | |
| **1** | **Cleaner production**<br>The cleaner production concept, why cleaner production , difference with end of pipe concept, cleaner production and sustainable development, implementation of cleaner production, change of raw material, technology change, good operating practice, product change, on site reuse and recycling, who is responsible for cleaner production, government rules, green synthesis of nano particles. | **9** |
| **2** | **Cleaner methodology**<br>Six steps methodology for CP, Designation of cleaner production team, analyze process steps, generating cleaner production opportunities, selecting cleaner production solutions, Implementation, maintaining cleaner production. Role of C.P. in survival and sustainable development of chemical industries. | **9** |

| | | |
|---|---|---|
| **3** | **Good housekeeping**<br>Overview of good housekeeping, what is needed to implement good housekeeping? Checklists for GHK, process modification / changes, process technology innovations, equipment modification, reuse and recycle. | **12** |
| **SECTION - B** | | |
| **4** | **Introduction to green chemistry**<br>Introduction, Need for Green Chemistry. Goals of Green Chemistry. Limitations/Obstacles in the pursuit of the goals of Green Chemistry. Definition and concepts: green chemistry; sustainable consumption of resources; individual and community level participation such as small-scale composting pits for biodegradable waste. | **9** |
| **5** | **Principles of green chemistry and designing a chemical synthesis**<br>Twelve principles of Green Chemistry with their explanations and examples; Designing a Green Synthesis using these principles; Prevention of Waste/byproducts; maximum incorporation of the materials used in the process into the final products (Atom Economy). | **9** |
| **6** | **Green chemical strategies for sustainable development**<br>Areas of green chemistry, reaction mass balance-atom economy, evaluation for chemical reaction efficiency, green solvents/ reaction media, catalysis and bio catalysis. microwave oven as a reactor, theory of microwave heating. | **12** |

**Suggested Specification table with Marks (Theory):**

| **Distribution of Theory Marks (%)** | | | | | |
|---|---|---|---|---|---|
| R Level | U Level | A Level | N Level | E Level | C Level |
| **25** | **30** | **10** | **15** | **10** | **10** |

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

**Text Books:**

1. Anastas, P. T., Warner, J. Green Chemistry: Theory and Practice; Oxford University Press: London, (1998).
2. Mukesh Doble, Anil Kumar Kruthiventi, in Green Chemistry and Engineering, 2007
3. V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, Anamalaya Publishers (2005).
4. P.T. Anastes & J.K. Warmer: Oxford Green Chemistry- Theory and Practical, University Press (1998). 5. A.S. Matlack: Introduction to Green Chemistry, Marcel Deckkar (2001).

**Reference Books:**

5. Cleaner Production Worldwide, 1993, United Nations Environment Programme, Industry and Environment, Paris, France, 1993
6. Cleaner Production: Training Resource Package, UNEP IE, Paris, 1996
7. Clean Technology for manufacture of Specialty Chemicals, Editor-W. Hoyle and M. Lancaster, Royal Society of Chemistry, U.K.
8. Engineers Guide to Cleaner Production Technologies by Paul M. Randall.
9. M.C. Cann & M.E. Connely: Real-World cases in Green Chemistry, American Chemical Society, Washington (2000).
10. M.A. Ryan & M. Tinnesand, Introduction to Green Chemistry, American Chemical Society, Washington (2002).

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Connect cleaner production & cleaner technology as remedial measures for mitigating climate change. | 15% |
| CO-2 | Appraise the energy conservation via cleaner technology options. | 15% |
| CO-3 | Discuss sound knowledge of different technologies available for good housekeeping. | 20% |
| CO-4 | Develop an understanding of cleaner production and green synthesis methods. | 15% |
| CO-5 | Judge the green process options available for the conventional processes being followed in chemical industries. | 15% |
| CO-6 | Relate the role of cleaner production in sustainable development in chemical industries. | 20% |

**List of Open Source Software/learning website:**

1. www.scew.gov.au/.../anzecc-ppr-towards-sustainability-achieving-cleane
2. www.unep.org/Pdf/Capacity_building.pdf
3. www.iisd.ca/consume/unep.html
4. https://sia-toolbox.de/sites/default/files/2023-08/08-cleaner-production-manual.pdf
5. https://nptel.ac.in/courses/103107157
6. https://www.uu.se/download/18.58b4b52318eeff6cc4c5090a/1713781004473/Cleaner%20Production%20-%20Technologies%20and%20Tools%20for%20Resource%20Efficient%20Production.pdf

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code: ESE401-4C
## Course Name: Practicals in Environmental Science-II
## Semester: II

**w.e.f.: July 2025**

**Type of Course:** Minor course

**Prerequisite:** Should have fundamental knowledge glassware's and apparatus used in environmental science lab.

**Rationale:** At the end of the course students will have knowledge to explore the sources, impacts, and mitigation strategies of air pollution, soil pollution, cleaner production, and green chemistry. Air and soil pollution significantly affect human health, biodiversity, agricultural productivity, and climate stability, making it crucial. Cleaner production promotes sustainable industrial practices by minimizing waste and resource consumption at the source, while green chemistry supports the design of safer, environmentally friendly chemical processes and products.

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | C | CCE Marks | SEE Marks | |
| | - | 8 | 4 | 50 | 50 | 100 |

**Contents:**

| Sr. No. | Content | Total Hrs. 120 |
|---|---|---|
| | **List of Practicals** | |
| | 1. To determine the pH and conductivity of soil samples.<br>2. To determine the total organic matter present in the soil sample.<br>3. Determination of selected elements in mineral and ore.<br>4. Estimation of oil and grease from soil/water sample.<br>5. Comparison of atom economy in traditional vs. green synthesis reaction of aspirin.<br>6. Determination of iron without toxic reagents using UV-Visible spectrophotometric.<br>7. Preparation of polylactic acid (PLA) or starch-based plastic. | **120** |

| | | |
|---|---|---|
| | 8. Extraction of limonene from citrus peel using D-limonene or ethanol.<br>9. Esterification using lipase as a catalyst.<br>10. Synthesis of benzylideneacetophenone via microwave heating.<br>11. To conduct Aldol condensation under solvent-free conditions.<br>12. To perform a basic LCA of a given product or process.<br>13. Measurement of SOx, NOx in air sample using air sampler.<br>14. Determination of frequency and average wind speed for a location by plotting wind rose.<br>15. Measurement of rainfall over a particular area.<br>16. Measuring Noise level at different work place.<br>17. Measurement of SPM/RSPM using air sampler.<br>18. To monitor the humidity of a location by using different parameters (Absolute humidity, Relative humidity, Mixing Ratio, vapour pressure, dew point).<br>19. Measurement of productivity of the pond ecosystem by Winkler's Oxygen liberation method.<br>20. Determination of Important Value Index some species in a grassland ecosystem. | |

**Reference Books:**

1. Gururajan B. Text Book of Soil & Environment, ISBN-9789355403322, Kalyani publishers, (2023).
2. Sally A. Henrie, Green Chemistry Laboratory Manual for General Chemistry, 1st Edition, ISBN-9780367238001, Informa UK Limited, an Informa Plc company, (2015).

**Course Outcomes:**

**After completing this course, student will be able to**

| Sr. No. | CO statement | Marks % weightage |
|---|---|---|
| CO-1 | Determination of concentration of unknown solution via colormetrically. | 10% |
| CO-2 | Able to determine distribution coefficient and the rate of acid-catalyst iodination reaction. | 20% |
| CO-3 | Determine the solubility product of AgCl, CMC value of surfactant. | 20% |
| CO-4 | Understand concepts of preparation of pharmaceutical organic molecules. | 20% |
| CO-5 | Acquainted with the practical rearrangement of organic molecules. | 10% |

| | | |
|---|---|---|
| CO-6 | Acquainted with the synthesis of commercially important organic molecules. | 20% |

## Distribution of Practical Marks

| A Level | B Level | C Level | D Level |
|---|---|---|---|
| **10** | **15** | **15** | **10** |

**Legends:**

A= Conduction of Practical

B= Regular Record Writing

C= Viva –Voce

D= Understanding of Experiments

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research
## Master of Science
## Course Code:
## Course Name: Research Project/on the Job Training
## Semester: I/II

**w.e.f.: July 2025**

Considering that some students choose academics and research as their career while others prefer industrial jobs, the students shall get two options to meet their specific need – (i) Plan A: Research Project, and (ii) Plan B: on the Job Training. The program coordinator and placement officer shall conduct an orientation session in semester 1 so that the students can take informed decision to choose between the two options.

### PLAN A- Research Project

**Type of Course:** Core course

**Prerequisite:** Basic Knowledge of environmental science and technologies.

**Rationale:** To help students learn about the research in state-of-the-art research institutions. This will also provide the students an opportunity to practically use their environmental science based skills in a typical research environment**.**

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | C | CCE Marks | SSE Marks | |
| 0 | 0 | 120 | 4 | 40 | 60 | 100 |

**Content:**

| Sr. No. | Content | Total Hrs. |
|---|---|---|
| | | |
| **1** | The students shall carry out 02 week research project in an academic or research institution of national/international repute. They must prepare a report on a specific template provided by the Department of Environmental Science. Upon completion of the research project, students are required to present their work before the expert committee. Students must submit 01 copy of their report to the department. | **120** |

# UPL -University of Sustainable Technology

## SRICT Institute of Science & Research

**PLAN B- on the Job Training**

**Type of Course:** Core course

**Prerequisite:** Basic Knowledge of environmental science and technologies.

**Rationale:** To provide students with practical, real-world experience, focusing on work experience, professional activities, or cooperative education, at the end of the course, students will learn about the application of environmental science concepts in modern chemical/environmental industries. This will also provide the students an opportunity to practically use their environmental science based skills in an industry.

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | Total Marks |
|---|---|---|---|---|---|---|
| L | T | P | C | CCE Marks | SSE Marks | |
| 0 | 0 | 180 | 4 | 40 | 60 | 100 |

**Content:**

| Sr. No. | Content | Total Hrs. |
|---|---|---|
| | | |
| 1 | The students shall carry out 04 week internship in an industry of national/international repute. They must prepare an internship report on a specific template provided by the University. Upon completion of the internship, students are required to present their work before the expert committee. Students must submit 01copy of their spiral internship report to the department. | 180 |