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|---|---|--|----------|-------------------|----------|----------------|-------------------------|----------|----------|
| <b>CHY1002</b>  | <b>Environmental Sciences</b>                                 |  |          |                   | <b>L</b> | <b>T</b>       | <b>P</b>                | <b>J</b> | <b>C</b> |
|   |   |  | <b>3</b> | <b>0</b>          | <b>0</b> | <b>0</b>       | <b>0</b>                | <b>3</b> |          |
| <b>Pre-requisite</b>  |   |  |          |                   |          |                | <b>Syllabus version</b> |          |          |
|   |   |  |          |                   |          |                | 1.1                     |          |          |
| <b>Course Objectives:</b>   |   |  |          |                   |          |                |                         |          |          |
| 1. To make students understand and appreciate the unity of life in all its forms, the implications of life style on the environment.<br>2. To understand the various causes for environmental degradation.<br>3. To understand individuals contribution in the environmental pollution.<br>4. To understand the impact of pollution at the global level and also in the local environment.  |   |  |          |                   |          |                |                         |          |          |
| <b>Expected Course Outcome:</b> Students will be able to  |   |  |          |                   |          |                |                         |          |          |
| 1. Students will <b>recognize</b> the environmental issues in a problem oriented interdisciplinary perspectives<br>2. Students will <b>understand</b> the key environmental issues, the science behind those problems and potential solutions.<br>3. Students will <b>demonstrate</b> the significance of biodiversity and its preservation<br>4. Students will <b>identify</b> various environmental hazards<br>5. Students will <b>design</b> various methods for the conservation of resources<br>6. Students will <b>formulate</b> action plans for sustainable alternatives that incorporate science, humanity, and social aspects<br>7. Students will have foundational <b>knowledge</b> enabling them to make sound life decisions as well as enter a career in an environmental profession or higher education. |   |  |          |                   |          |                |                         |          |          |
| <b>Student Learning Outcomes (SLO):</b>   |   |  |          | 1,2,3,4,5,9,11,12 |          |                |                         |          |          |
| <b>Module:1</b>   | <b>Environment and Ecosystem</b>                              |  |          |                   |          | <b>7 hours</b> |                         |          |          |
| Key environmental problems, their basic causes and sustainable solutions. IPAT equation. Ecosystem, earth – life support system and ecosystem components; Food chain, food web, Energy flow in ecosystem; Ecological succession- stages involved, Primary and secondary succession, Hydrarch, mesarch, xerarch; Nutrient, water, carbon, nitrogen, cycles; Effect of human activities on these cycles.  |   |  |          |                   |          |                |                         |          |          |
| <b>Module:2</b>   | <b>Biodiversity</b>   |  |          |                   |          | <b>6 hours</b> |                         |          |          |
| Importance, types, mega-biodiversity; Species interaction - Extinct, endemic, endangered and rare species; Hot-spots; GM crops- Advantages and disadvantages; Terrestrial biodiversity and Aquatic biodiversity – Significance, Threats due to natural and anthropogenic activities and Conservation methods.   |   |  |          |                   |          |                |                         |          |          |
| <b>Module:3</b>   | <b>Sustaining Natural Resources and Environmental Quality</b> |  |          |                   |          | <b>7 hours</b> |                         |          |          |
| Environmental hazards – causes and solutions. Biological hazards – AIDS, Malaria, Chemical hazards- BPA, PCB, Phthalates, Mercury, Nuclear hazards- Risk and evaluation of hazards. Water footprint; virtual water, blue revolution. Water quality management and its conservation. Solid and hazardous waste – types and waste management methods.   |   |  |          |                   |          |                |                         |          |          |

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| Module:4   | Energy Resources   | 6 hours    |                 |
| Renewable - Non renewable energy resources- Advantages and disadvantages - oil, Natural gas, Coal, Nuclear energy. Energy efficiency and renewable energy. Solar energy, Hydroelectric power, Ocean thermal energy, Wind and geothermal energy. Energy from biomass, solar- Hydrogen revolution. |  |            |                 |
| Module:5   | Environmental Impact Assessment  | 6 hours    |                 |
| Introduction to environmental impact analysis. EIA guidelines, Notification of Government of India (Environmental Protection Act – Air, water, forest and wild life). Impact assessment methodologies. Public awareness. Environmental priorities in India.                                      |  |            |                 |
| Module:6   | Human Population Change and Environment  | 6 hours    |                 |
| Urban environmental problems; Consumerism and waste products; Promotion of economic development – Impact of population age structure – Women and child welfare, Women empowerment. Sustaining human societies: Economics, environment, policies and education.                                   |  |            |                 |
| Module:7   | Global Climatic Change and Mitigation  | 5 hours    |                 |
| Climate disruption, Green house effect, Ozone layer depletion and Acid rain. Kyoto protocol, Carbon credits, Carbon sequestration methods and Montreal Protocol. Role of Information technology in environment-Case Studies.   |  |            |                 |
| Module:8   | Contemporary issues  | 2 hours    |                 |
| Lecture by Industry Experts  |  |            |                 |
|  | Total Lecture hours:   | 45 hours   |                 |
| Text Books   |  |            |                 |
| 1.   | G. Tyler Miller and Scott E. Spoolman (2016), Environmental Science, 15 <sup>th</sup> Edition, Cengage learning.   |            |                 |
| 2.   | George Tyler Miller, Jr. and Scott Spoolman (2012), Living in the Environment – Principles, Connections and Solutions, 17 <sup>th</sup> Edition, Brooks/Cole, USA. |            |                 |
| Reference Books  |  |            |                 |
| 1.   | David M.Hassenzahl, Mary Catherine Hager, Linda R.Berg (2011), Visualizing Environmental Science, 4thEdition, John Wiley & Sons, USA.                              |            |                 |
| Mode of evaluation: Internal Assessment (CAT, Quizzes, Digital Assignments) & FAT  |  |            |                 |
| Recommended by Board of Studies  |  | 12.08.2017 |                 |
| Approved by Academic Council   |  | No. 46     | Date 24.08.2017 |