Course title: Industrial Ecology

Course code: NRE 129  No. of credits: 3  L-T-P: 28-14-0  Learning hours: 42

Pre-requisite course code and title (if any): NRE 131 Environmental Chemistry and Microbiology, NRE 137 Environmental Monitoring laboratory

Department: Department of Energy and Environment

Course coordinator:  Course instructor: Dr Lakshmi Raghupathy

Contact details:

Course type: Elective  Course offered in: Semester 3

Course Description
Industrial ecology involves the study of industrial systems with a view to identifying strategies that emulate ecological ecosystems and that can be applied to try to minimize the waste produced in industrial processes and to recycle or reuse as much of the waste as possible. This would involve primarily, the development of cyclic, as opposed to linear processes.

This course aims to introduce the concepts underlying industrial ecology and some tools used in it. It will also discuss eco-industrial development, the key issues involved and some cases from India. It will, therefore, expose students to the multidisciplinary nature of environmental issues and integrate pollution prevention with sustainable development.

As an economy that is developing at a rapid pace, Indian industry should be planned with eco-industrial goals and strategies. This course will attempt to show how that might be done.

Course objectives

Course content

<table>
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<tr>
<th>SNo</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1.</td>
<td>Introduction to industrial ecology</td>
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<td>2.</td>
<td>Origin of IE, its definition, the environment and the anthrosphere, industrial systems, material resources, societal factors and environmental equity. Link to sustainable development.</td>
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<td>3.</td>
<td>Ecologically sustainable systems</td>
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<td>4.</td>
<td>The environment and the anthrosphere, industrial systems, material resources, societal factors and environmental equity. Link to sustainable development.</td>
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<td>5.</td>
<td>Goals and concepts</td>
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<td>6.</td>
<td>Systems analysis, industrial metabolism, biological analogies, material and energy flow and their transformations, closing the materials cycle (open vs, closed-loop systems)</td>
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<td>7.</td>
<td>Industrial ecosystems and key issues in eco-industrial development</td>
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<td>8.</td>
<td>Components of an industrial ecosystem (Kalundborg example), industrial symbiosis, role of government, community, developers, management, evaluating the success of eco-industrial development.</td>
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<td>9.</td>
<td>Life Cycle Analysis</td>
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10. Life cycles of products, processes and facilities; life cycle assessment (components, methodology, applications, difficulties), design for environment, efficient use of material (remanufacturing, recycling, reuse, etc.)

11. Perspective on industrial ecology from India and other developing countries such as China and Thailand, with cases studies.

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<th>Evaluation criteria</th>
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<tr>
<td>Minor test:</td>
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<td>Major test (end semester):</td>
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<td>Seminar:</td>
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<td>Class discussions/participation:</td>
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<td>Tour report:</td>
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**Total** 28 14

**Pedagogical approach**

**Materials**

**Required text**


**Suggested readings**


Case studies

Websites

Journals

1. Environmental Science & Technology
2. Journal of Industrial Ecology

Additional information (if any)

Student responsibilities

Attendance, feedback, discipline, guest faculty etc