Industrial Ecology: principles, methods and applications

Academic year 2016 – 2017
Hours of lecture: 20 hours (3cfu)

Teacher
Roberta Salomone
Full Professor in Environmental Management and Industrial Ecology (Commodity Sciences)
Department of Economics - University of Messina - Piazza S. Pugliatti, 1 - 98122 Messina (Italy)
roberta.salomone@unime.it

Course description
The course focuses on giving an overview on Industrial Ecology (IE) (its framework, definition, principles and content) and presents the developments in research and application in the field of industrial ecology by examining the main methods through the analysis of case studies. IE has become an important field of study because it aims to manage the transition from the today’s unsustainable industrial systems to sustainable ones. The basic concept is the design of industrial systems that mimic the behavior of natural ecosystems. With this aim, understanding the functioning of the physical basis of the anthroposphere and the exchange of material and energy with the environment is crucial. The vision of a sustainable industrial system is characterised by minimised physical exchanges with the environment and the maximisation of the internal material loops. By studying the flow of materials and energy through industrial systems, industrial ecology identifies economic ways to lessen negative environmental impacts, chiefly by reducing pollution at the source, minimizing energy consumption, designing for the environment, and promoting sustainability.

Keywords: Industrial Ecology, Industrial Symbiosis, Sustainable development

Content
- Definition, scope, objects and methods of industrial ecology (IE).
- Overview of the main methods: Life-Cycle Assessment and Material Flow Analysis.
- Analysis of case studies of Eco-Industrial Parks.

Textbooks from which some materials are drawn

Course Objectives
At the end of the course, the student should understand the character, scope, and research questions addressed by industrial ecology; have a basic general understanding of the main IE methods and instruments and of their utility in the field of industrial metabolism; know the main examples and case studies of application of IE principles.

Course Format
Lectures; Sets of reading critiques; Tutorials.

Evaluation
Students are required to prepare an essay on one of the topics covered during the course. Further information will be provided during the course.

Calendar
May: 8th, 9th, 10th, 11th, 12th.
<table>
<thead>
<tr>
<th>Hours</th>
<th>Lectures</th>
<th>Reading critiques</th>
<th>Tutorials</th>
<th>Suggested readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Definition, scope, objects and methods of industrial ecology (IE)</td>
<td>Frosch, R. and N. Gallopoulos, Strategies for manufacturing, Scientific American, 261(3):144-152, 1989</td>
<td>Ayres R.U., Ayres L.W. 2002. Chapters 1 and 2;</td>
<td>Graedel T.E., Allenby B.R. 2010 Chapters 1, 2, and 3;</td>
</tr>
<tr>
<td>4</td>
<td>Overview of the main methods Life Cycle Assessment</td>
<td>-</td>
<td>Case studies practices on an LCA software</td>
<td></td>
</tr>
</tbody>
</table>