

General Information	
Academic subject	Industrial Ecology
Degree course	Business and Management Strategies
Curriculum	
ECTS credits	8
Compulsory attendance	Yes
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Bruno Notarnicola	bruno.notarnicola@uniba.it	SECS-P/13

ECTS credits details	Disciplinary field	SSD	ECTS credits
Basic teaching activities	Commodity science	SECS-P/13	8

Class schedule	
Period	First semester
Year	I
Type of class	Front lessons

Time management	
Hours	200
In-class study hours	64
Out-of-class study hours	136

Academic calendar	
Class begins	September 13, 2021
Class ends	December 23, 2021

Syllabus	
Prerequisites/requirements	No
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> The Industrial Ecology course aims to provide students with in-depth specialist knowledge relating to the interactions between production processes and the environment, the eco-efficient use of raw materials in the same and the tools applicable for the improvement of production in key sustainable. (such as Eco-design, Life Cycle Assessment, Material Flow Analysis, Input-Output Analysis)</li> <li>• <i>Applied knowledge and understanding</i> Having acquired the basic concepts and terminology, the student will have in-depth knowledge of the approaches and tools of Industrial Ecology and the practical aspects of LCA assessments using Software.</li> <li>• <i>Autonomy of judgment</i> The course aims at the student's understanding of the most current environmental dynamics related to industrial ecosystems, the ability to evaluate the realization of a sustainable production or production process and with a problem-solving approach.</li> <li>• <i>Communication skills</i> At the end of the course, the student will have acquired the technical language useful for facing and covering</li> </ul>

	<p><i>managerial positions (such as Environmental Managers or Sustainability Managers), as well as providing advice on real cases.</i></p> <ul style="list-style-type: none"> <li>• <i>Ability to learn</i></li> </ul> <p><i>The goal is to give the student an analytical technical-managerial ability. Finally, through the study of environmental management and assessment tools, it offers students the knowledge acquired that can be used on the territory both for public administration and private companies.</i></p>
<p>Contents</p>	<p>Definition of Industrial Ecology (EI). Schematic of the main physical interactions between the economic system and the environmental system. Industrial metabolism and environmental metabolism Historical evolution of EI: the different approaches to cleaner production (end-of-pipe, cleaner production, industrial symbiosis). Concepts and principles of EI. Review of the main EI approaches and tools. Design for the Environment (DfE), Eco-design. Notes on integrated quality-environment design tools The life cycle of the product from an EI perspective: from the cradle to the grave. Life Cycle Assessment (LCA) as an environmental management tool in an extended life cycle perspective. Simplified approaches to LCA. Notes on other environmental management and evaluation tools (Substance Flow Analysis, Material Flow Analysis, Input-Output Analysis). Ecological labels (Ecolabel, EPD, PEF). Eco-industrial parks. The paradigmatic case of Kalundborg, the Closed Project, the Humber region, the Taranto case study. LCA Software Analysis.</p>
<p>Course program</p>	
<p>Bibliography</p>	<ul style="list-style-type: none"> <li>• Notarnicola B. 2020: “Appunti dalle lezioni”.</li> <li>• Notarnicola B., 2008. Strumenti tecnici a supporto delle certificazioni ambientali: l’Analisi del Ciclo di Vita (LCA), 2008. In Buonfrate A.: Codice dell’Ambiente, UTET pg. 787-811.</li> <li>• Ehrenfeld J., Gertler N., 1997. Industrial Ecology in Practice The Evolution of Interdependence at Kalundborg, <i>Journal of Industrial Ecology</i>, 1(1) pp.67-79.</li> <li>• Mirata M., 2004. Experiences from early stages of a National industrial symbiosis programme in the UK. Determinants and coordination challenges, <i>Journal of Cleaner production</i>, 12 (8-10), pp.967-983.</li> <li>• Notarnicola B., Uricchio A.F., Tassielli G., Renzulli P.A., Selicato G., 2012. Elaborazione di un modello di applicazione dei principi e degli strumenti dell’ecologia industriale ad un’area vasta. Cacucci Editore, Bari (Un capitolo a scelta).</li> </ul> <p>Recommended reading</p> <ul style="list-style-type: none"> <li>• Graedel TE, Allembly BR., 2002: <i>Industrial Ecology</i>, Upper Saddle River, NJ, Prentice-Hall</li> <li>• Notarnicola B., Tassielli G., Settanni E., 2005. Life Cycle Costing e ambiente: lineamenti metodologici e applicazione alla produzione di energia elettrica. <i>Ambiente, Risorse, Salute</i>, n. 101, 14-19.</li> </ul>

Notes	
Teaching methods	Lectures, internal cycles of lessons, exercises, seminars, laboratory activities, study visits. Course present in the e-learning area of the Faculty website.
Assessment methods (indicate at least the type written, oral, other)	Oral interview
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are.	<p>The student will have a broad view of the current entrepreneurial possibilities related to industrial ecology and the circular economy.</p> <p>The student, having acquired the basic concepts and terminology, will have in-depth knowledge of the approaches and tools of Industrial Ecology and the practical aspects of LCA assessments using the Software.</p> <p>The student will be able to understand all the theoretical problems and propose solutions and options for improving the environmental profile.</p> <p>The student will acquire adequate managerial skills with the aim of providing business consultancy about industrial ecology and the circular economy.</p>
Further information	