Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IND344	Industrial Ecology And Sustainable Engineering	5	3	0	0	3	4

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Elective
Course Level	Bachelor Degree
Objective	In general, industrial ecology (IE) is a system based and multidisciplinary research field aiming to understand the complex behavior of integrated man/nature made systems. In particular, it consists of the evolution of the industrial processes from linear systems (open cycle) that transform the resources and the capital into waste, to closed systems that use waste as input to new processes. Whereas sustainable engineering (SE) consists of the responsible usage of the resources without compromising the ability of future generations to meet their own needs. Sustainable engineering requires questioning the social, economic and environmental effects of engineering solutions in the sort and long term. As the negative effects of the existing economic development models are quite apparent today, this elective course is significant for our students to understand the environmental and social impacts of the engineering applications they will realize after their graduation. Within this context, the objectives of this course are: • To create awareness of effects of technological development on the environment and society. • To establish an understanding of the multidimensional sustainability concept and to show the students how they can measure the sustainability of the systems. • To enable students to evaluate the effects of a product design on the environment during its life-cycle. • To show students to they can design sustainable products
Content	Humanity and Technology, The Concept of Sustainability, IE and SE Concepts, Biological Ecology and Metabolic Analysis, Technology and Risk, Sustainable Engineering, Technological Product Development and Design for Environment and Sustainability, Life Cycle Assessment, Streamlining the LCA Process, Industrial Ecosystems, Modeling in Industrial Ecology, IE and SE in Developing Economies and the Corporation
References	1. Chang, N.B., “Systems Analysis for Sustainable Engineering: Theory and Applications”, McGraw-Hill, 2010. 2. Stasinopoulos, P., Smith, M.H., Hargroves, K.C., Desha C., “Whole System Design: An Integrated Approach to Sustainable Engineering, Earthscan Publications”, 2009. 3. Hendrickson, C., Lave, L., Matthews, H.S., “Environmental Life Cycle Assessment of Goods and Services: an Input-Output Approach”, RFF Press, Washington, D.C., 2006.

Theory Topics

Week	Weekly Contents
1	Humanity and Technology
2	The Concept of Sustainability
3	IE and SE Concepts
4	Biological Ecology and Metabolic Analysis
5	Technology and Risk
6	Sustainable Engineering
7	Technological Product Development and Design for Environment and Sustainability
8	Midterm
9	Life Cycle Assessment
10	Streamlining the LCA Process
11	Industrial Ecosystems
12	Modeling in Industrial Ecology
13	IE and SE in Developing Economies and the Corporation

Week	Weekly Contents
14	Project Presentations