

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Ekologia przemysłowa - wybrane zagadnienia**  
 Name in English: **Industrial ecology - selected problems**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable): **Renewable Energy Systems**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **obligatory**  
 Subject code: **ELR031338**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	15				15
Number of hours of total student workload (CNPS):	30				30
Form of crediting:	crediting with grade				crediting with grade
For group of courses mark (X) final course:					
Number of ECTS points:	1				1
including number of ECTS points for practical (P) classes :					1
including number of ECTS points for direct teacher-student contact (BK) classes:	0.70				0.70

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Basic knowledge of biology at the secondary school level
2. Can efficiently and effectively apply the knowledge from publicly available sources of information.

**SUBJECT OBJECTIVES**

- C1. Knowledge of various aspects of industrial ecology.
- C2. Capability of analysis and recognition of problems related to waste reduction and modeling of industrial processes in accordance with principles of laws of nature.

**SUBJECT EDUCATIONAL EFFECTS***relating to knowledge:*

- PEK\_W01 Knows the basic principles of ecology. Has a basic knowledge of environmental issues and the design of industrial systems modelled on biological systems.
- PEK\_W02 Has knowledge of the science of environmental sustainability and industrial engineering. Knows the tools to analyze the impact of industrial processes on the environment.
- PEK\_W03 Has ordered knowledge of the application of industrial ecology in the business, cost reduction, organizational optimization and integration of new technologies

*relating to skills:*

- PEK\_U01 The ability to identify and analyze the problems relating to the reduction of environmental burden and development of industrial processes in accordance with the environment.
- PEK\_U02 Knows how to use tools for the life cycle assessment, life cycle inventory and impact assessment.

*relating to social competences:*

- PEK\_K01 Is aware of the importance and understanding of non-technical aspects and impacts of engineering, including its impact on the environment, and consequently the responsibility for decisions.

## PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	General presentation of industrial ecology. The role of biodiversification in human activity. Industry as living system within living systems.	2
Lec 2	Capability of imitation of the nature. Fundamental laws of industrial ecology	2
Lec 3	Dynamics of ecosystems, its limitations in industry. Ecological systems and natural systems.	2
Lec 4	Methods and tools of industrial ecology.	2
Lec 5	Industrial metabolism. Modeling of input/output dynamics. Waste prevention, examples	2
Lec 6	New opportunities for administration, policy and regulations, local government, government's role.	2
Lec 7	Strategies and implementation of IE. Decentralized processes, social and economic control. public/private dialogue, research.	2
Lec 8	Test.	1
Total hours:		<b>15</b>

Form of classes - seminar		Number of hours:
Sem 1	Introduction. Presentation topics for discussion. The division into research groups. Discuss and prepare presentations on the topics discussed in the lecture.	2
Sem 2	The lifetime of the product, business services, applications in the future.	2
Sem 3	New perspectives related to the application of industrial ecology in business, cost reduction, new markets, marketing, organizational change, the integration of new technologies.	2
Sem 4	Industrial ecosystems and ecological industrial parks. Costs, risks and challenges associated with the creation of EIP (Eco-Industrial Parks).	2
Sem 5	Examples in the field of energy and transportation, etc.	2
Sem 6	Examples in the field of production, telecommunications, construction, etc.	2
Sem 7	Evaluation of the possibility of transformation of selected industries in the spirit of industrial ecology.	2
Sem 8	Evaluation of students' work	1
Total hours:		<b>15</b>

## TEACHING TOOLS USED

- N1. Lecture using traditional techniques, audiovisual, multimedia presentations, transparencies  
 N2. Seminar using traditional techniques, audiovisual, multimedia presentations, transparencies.

## EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation <i>F – forming (during semester) P – concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEK_W01 PEK_W02 PEK_W03	Written test
P(w)	P = F1	
F2(s)	PEK_U01 PEK_U02 PEK_K01	Presentation
P(s)	P = F2	

## PRIMARY AND SECONDARY LITERATURE

### PRIMARY LITERATURE:

- [1] Graedel T E, Allenby B.: Industrial Ecology and Sustainable Engineering, Pearson Education, Inc., 2010.  
 [2] Allenby B, Allenby R, Deanna J.: The Greening of Industrial Ecosystems, National Academy Press, Washington, 1994.  
 [3] IEEE White Paper on Sustainable Development and Industrial Ecology, IEEE 1995.

### SECONDARY LITERATURE:

Literature provided by the lecturer

## SUBJECT SUPERVISOR

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**ELR031338 - Industrial ecology - selected problems**  
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**  
AND SPECIALIZATION **Renewable Energy Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	S2RES_W09	C.1 C.2	Lec1 Lec2 Lec3	N.1
PEK_W02	S2RES_W09	C.1 C.2	Lec4 Lec5 Lec6	N.1
PEK_W03	S2RES_W09	C.1 C.2	Lec7 Lec8	N.1
PEK_U01	S2RES_U09	C.1 C.2	Sem1 Sem2 Sem3 Sem4 Sem5 Sem6 Sem7 Sem8	N.1 N.2
PEK_U02	S2RES_U09	C.1 C.2	Sem1 Sem2 Sem3	N.1 N.2
PEK_K01	K2ETK_K03	C.1 C.2	Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Sem1 Sem2 Sem3 Sem4 Sem5 Sem6 Sem7 Sem8	N.1 N.2