

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: **ELR041338**
 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:		15

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:		15

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
ELR041338 - 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