



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

INDUSTRY 4.0 AND RECOGNIZING OPPORTUNITIES IN THE TRANSITION OF THE ENTERPRISE TO A CIRCULAR ECONOMY [S5NOZIJ>PROT]

### Course

Proposed by Discipline

–

Year/Semester

2/4

Level of study

Doctoral School

Course offered in

English

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

8

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

prof. dr hab. inż. Stefan Trzcieliński  
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### Lecturers

### Prerequisites

Knowledge: Segments of the macro-environment and industrial environment of an enterprise; the general organizational structure of an industrial enterprise; the concept of the lean enterprise; the concept of the agile enterprise. Skills: Obtaining primary and secondary data on the enterprise environment; data analysis aimed at identifying opportunities. Social competencies: effective communication with participants of the organisation, teamwork, arguing own judgements.

### Course objective

Understanding the impact of Industry 4.0 technologies on the emergence of business opportunities.

### Course-related learning outcomes

A PhD student who graduated from doctoral school knows and understands:

- 1) global achievements, covering theoretical foundations as well as general and selected specific issues that are relevant to scientific disciplines studied at the Doctoral School, to the extent that enables revision of existing paradigms, [P8S\_WG/SzD\_W01]
- 2) key developmental trends of disciplines of science in which education at the Doctoral School takes place, [P8S\_WG/SzD\_W02]
- 3) scientific research methodology in disciplines represented at the Doctoral School, [P8S\_WG/SzD\_W03]

4) fundamental dilemmas of the contemporary civilization, [P8S\_WK/SzD\_W05].

#### Skills

A PhD student who graduated from doctoral school can:

- 1) critically analyze and assess scientific research results, work of experts and other creative activities together with their contribution into knowledge development, [P8S\_UW/SzD\_U02]
- 2) communicate on specialist issues on the level that allows active participation in the international scientific community, [P8S\_UK/SzD\_U04]
- 3) share results of scientific activity also in a popular form, [P8S\_UK/SzD\_U05]
- 4) take part in scientific discourse, [P8S\_UK/SzD\_U07].

#### Social competencies

A PhD student who graduated from doctoral school is ready to:

- 1) critically assess achievements within a given scientific discipline, [P8S\_KK/SzD\_K01]
- 2) critically evaluate their own contribution to development of a given scientific discipline, [P8S\_KK/SzD\_K02]
- 3) acknowledge the importance of knowledge in solving cognitive and practical problems, [P8S\_KK/SzD\_K03]
- 4) think and act in an entrepreneurial manner, [P8S\_KO/SzD\_K06].

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

W01, W02, W03, W05

Conversation during the lecture

- Correctness of answers to questions
- Correctness of examples included in the doctoral student's statement

U02, U04, U05, U07

Completing the task during the lecture

Completing the final paper

- Correctly formulating an opportunity as a relationship between goals, resources, and the external situation
- Applying a systems approach to modeling relationships: Environmental Variables - Industry 4.0 Technologies - Circular Economy Variables - Opportunity

K01, K02, K03, K06

Completing the task during the lecture

Completing the final paper

- Applying a systems approach to modeling relationships: Environmental Variables - Industry 4.0 Technologies - Circular Economy Variables - Opportunity
- Simulating the impact of Industry 4.0 technologies on achieving circular economy goals.

### Programme content

1. Overview of Industry 4.0 Technologies and Their Applications in Production Management
2. Overview of Circular Economy Force Variables
3. Overview of Circular Economy Application Areas
4. Analytical and Simulation Methods for Opportunity Recognition

### Course topics

1. Introduction to Theory of Opportunity
2. Application of Industry 4.0 Technologies in Practice
3. Relationships: Environmental Variables - Industry 4.0 Technologies - Circular Economy - Opportunities

### Teaching methods

Lecture: multimedia presentation including illustrations and examples.

### Bibliography

#### Basic

1. Trzcielinski S., Pawlowski G. (2023). Knowledge in the Discovery of Market Opportunities. Proceedings of 24th European Conference on Knowledge Management ECKM 2023, Lisbon.
2. Trzcielinski S. (2023). Human Intelligence vs. Artificial Intelligence in Opportunity Discovery. In: Waldemar Karwowski and Stefan Trzcielinski (eds) Human Aspects of Advanced Manufacturing. AHFE (2023) International Conference. AHFE Open Access, vol 80. AHFE International, USA.  
<http://doi.org/10.54941/ahfe1003512>
3. Trzcieliński S. (2021). Model of the Opportunity Recognition Process. Proceedings of 37th IBIMA Conference, Cordoba.

#### Additional

Trzcieliński S. (2010). Przedsiębiorstwo zwinne. Wydawnictwo Politechniki Poznańskiej, Poznań.  
Trzcieliński S., Kruszyński M., Trzcielińska J. (2023). Shaping the enterprise's strategy – theory and practice; Kształtowanie strategii przedsiębiorstwa – teoria i praktyka. Publishing House of Poznan University of Technology, Poznań. [https://wydawnictwo.put.poznan.pl/books/isbn\\_978-83-7775-718-5](https://wydawnictwo.put.poznan.pl/books/isbn_978-83-7775-718-5)

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	8	0,00
Doctoral student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	42	2,00