



COURSE DESCRIPTION CARD - SYLLABUS

Course name

MECHANICAL ENGINEERING IN THE ERA OF INDUSTRY 4.0

Course

Proposed by Discipline

Mechanical engineering

Type of studies

Doctoral School

Form of study

full-time

Year/Semester

II/4

Course offered in

English

Requirements

elective

Number of hours

Lecture

4

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

Poznan University of Technology

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Responsible for the course/lecturer:

Prerequisites

Knowledge: key developmental trends in industry.

Skills: can use the knowledge from different branches of science to creatively identify, formulate and to innovatively solve complex problems.

Social competencies: can critically evaluate their own contribution to the development of a given scientific discipline.

Course objective

Acquiring knowledge on the impact of selected information technologies on the development of tools and methods of mechanical engineering in production systems in Industry 4.0.



Course-related learning outcomes

Knowledge

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

- 1) production systems, application of technological machines, organization of production systems, functioning of measuring systems, [P8S_WG/SzD_W01]
- 2) basic technologies and Industry 4.0 distinguishing systems, [P8S_WG/SzD_W01]
- 3) the application of information technologies of Industry 4.0 in mechanical technologies and in production systems. [P8S_WK/SzD_W07]

Skills

A PhD student who graduated from doctoral school can:

- 1) implementing the knowledge from information technologies in mechanical engineering systems. [P8S_UW/SzD_U01]

Social competences

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

- 1) strengthening awareness of the need for cooperation between various scientific disciplines. [P8S_KO/SzD_K06]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

PQF code	Methods for verification of learning outcomes	Assessment criteria
W01, W07	Presentation on the application of I 4.0 technology in the Phd students' field of interest	Attendance at lectures, submission the presentation
U01	as above	as above
K06	as above	as above

Programme content

1. Cyber Physical Space in the market and within an enterprise (Relations between mechanical engineering and other areas of engineering and business activity).
2. Product design (Integration of CAD/CAM/CAE systems, Implementation of KBE in design process).
3. Digital models („Digital twin” concept, Idea of Virtual Reality (VR) and Augmented Reality (AR)).
4. Technologies, tools and machine tools (Additive manufacturing, Intelligent cutting tools, Intelligent machine tools, Reconfigurable RSP production systems).
5. Measurement techniques and systems (In-process metrology, Simulation methods for measuring the accuracy of measurement).



Teaching methods

Lecture: multimedia presentation including illustrations and examples.

Bibliography

Basic

1. Hamrol A., Gawlik J., Sładek J., Mechanical Engineering for Industry 4.0, Management and Production Engineering Review - 2019, vol. 10, no. 3.

Additional

1. Alcaer V., Cruz-Machado V., Scanning the Industry 4.0: A Literature Review on Technologies for Manufacturing Systems, Engineering Science and Technology, vol. 22, 2019.

Breakdown of average student's workload

	Hours	ECTS
Total workload	20	1.0
Classes requiring direct contact with the teacher	8	0.5
Student's own work (literature studies, preparation for tutorials, project preparation) ¹	12	0.5

¹ delete or add other activities as appropriate