

**SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE:** Sebastian Koziółek  
**DEPARTMENT:** Mechanical Department  
**SCIENTIFIC DISCIPLINE:** Mechanical Engineering

### **COURSE CARD**

**Course name in Polish:** Inżynieria wynalazczości

**Course name in English:** Inventive Engineering

**Course language english**

**The course is intended for all PhD students: YES / NO**

- 1) ~~basic course~~
- 2) specialist course
- 3) ~~seminar~~
- 4) ~~humanistic course~~
- 5) language
- 6) ~~research skills~~

**Code cours: MEQ100272W**

	Lecture	Foreign Language Course	Seminar	Mixed forms Seminarium
Number of hours of organized classes in university (ZZU)				30
Grading				Presentation, report, activity
Number of ECTS points				0

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

1. The ability to design technical objects.
2. Ability to model CAD geometric parts and assemblies.
3. Ability to work in a team.

### **COURSE OBJECTIVES**

- C1. Acquiring knowledge about the methods of designing inventions with high innovative potential using systematic and heuristic methods.
- C2. Acquisition of knowledge in the field of innovation assessment using objective methods.
- C3. Acquisition of knowledge in the area of building inventive teams and acquiring knowledge
- C4. Acquiring the skills of conceptual design with the use of prototyping

C5. Acquiring the ability to plan and conduct inventive workshops using heuristic and systematic methods such as TRIZ, Syntectics, Design Thinking  
 C6. Acquiring skills in the field of commercialization of inventions and financing engineering

<b>Forma zajęć - mixed forms (mix)</b>		<b>Number of hours</b>
Mix1	Methods and tools of inventive design. Lecture and Group Discussion	2
Mix2	Overview of the methodology of Inventive Engineering. Lecture and Group Discussion	2
Mix3	Product and service innovation assessment. Case study	2
Mix4	Forecasting the development of products and services - phase "For", phase "Model". Lecture and Case Study	2
Mix5	Forecasting the development of products and services - phase "Analyzes", phase "Transfer". Lecture and Case Study	2
Mix6	Building inventive teams. Lecture and Group Discussion with Interview	2
Mix7	Heuristic and systematic knowledge acquisition Lecture	2
Mix8	Conceptual design using heuristic methods part 1/2 Lecture	2
Mix9	Conceptual design using heuristic methods part 2/2 Case study	2
Mix10	Conceptual design using systematic methods part 1/2 Lecture	2
Mix11	Conceptual design using systematic methods part 2/2 Case study	2
Mix12	Development of the design concept in terms of TEES changes: technical and technological, economic, environmental and social. Seminar	2
Mix13	Financing engineering - preparing a budget for the development and commercialization of inventions Lecture and Group Discussion	2
Mix14	Financing engineering - raising funds for the development of inventions and their commercialization Lecture and Group Discussion	2
Mix15	Evaluation classes	2
Suma godzin		<b>30</b>

### TEACHING TOOLS USED

- N1. traditional lecture with the use of transparencies and slides  
 N2. problem discussion  
 N3. case study  
 N4. Team work of students under the supervision of the teacher  
 N5. self study - preparation for project class

### ACHIEVED SUBJECT LEARNING OUTCOMES

Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	Report, participation in discussion
Knowledge	P8S_WK	Report, participation in discussion
Skills	P8S_UW	Report, participation in discussion
Skills	P8S_UO	Report, participation in discussion
Skills	P8S_UU	Report, participation in discussion
Social competence	P8S_KO	Presentation, participation in discussion
Social competence	P8S_KR	Presentation, participation in discussion

### PRIMARY AND SECONDARY LITERATURE

#### **PRIMARY LITERATURE**

- [1] S. Koziółek. Inventiveness engineering. Methodology of designing innovative technical systems. Publishing House of Wrocław University of Science and Technology, first edition. Wrocław 2019.  
 [2] T. Arciszewski, Inventive engineering: knowledge and skills for creative engineers. Taylor&Francis, 2016.  
 [3] W. J. J. Gordon, Synectics. The development of creative capacity. New York: MacMillan publishing co., Inc., 1961.

#### **SECONDARY LITERATURE**

- [1] S. Koziółek i T. Arciszewski, „Syntectical building of representation space: a key to computing education”, w Computing in Civil Engineering, 2011, ss. 1–15.  
 [2] K. Haines-Gadd, Triz for Dummies. Wiley, 2016.