



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Research methodology

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

18

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr inż. Wojciech Karpiuk

Responsible for the course/lecturer:

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Faculty of Civil Engineering and Transport

ul. Piotrowo 3 60-965 Poznań

### Prerequisites

Knowledge: The student has basic technical knowledge in the field of aviation.

Skills: The student is able to obtain information from literature, databases and other, properly selected sources.

Social competences: The student understands the need for lifelong learning, is able to inspire and organize the learning process of other people, understands the need and ability to self-educate, demonstrates the ability to work in a team.



### Course objective

Preparation for conducting scientific research, including the development of promotional works - the main goal.

Other goals:

- presentation of basic terms in the field of methodology of scientific works,
- teaching the ability to formulate research problems
- describing the methodological foundations of writing scientific and promotional papers (basic issues of their technical editing).

### Course-related learning outcomes

#### Knowledge

1. has basic knowledge necessary to understand social, economic, legal and other non-technical determinants of engineering activity [P7S\_WK, K2A\_W24]
2. Has knowledge of the method of presenting test results in tabular and graph form, performing the analysis of measurement uncertainties [K2A\_W29]
3. Has basic knowledge of research methods and how to prepare and conduct scientific research, and knows the rules of editing a scientific work [K2A\_W34]

#### Skills

1. can communicate with the use of various techniques in the professional environment and other environments using the formal notation of the structure, technical drawing, concepts and definitions of the scope of the field of study [P7S\_UK K2A\_U02]
2. can use formulas and tables, technical and economic calculations using a spreadsheet, specialized software [P7S\_UW, P7S\_UU, K2A\_U05]
3. Can plan and carry out a research experiment using measuring equipment, computer simulations, can perform measurements and interpret the results and draw conclusions [P7S\_UW, K2A\_U10]
4. Is able to prepare a short research paper, respecting the basic editorial rules. Is able to select appropriate methods for the conducted research and is able to carry out a basic analysis of the results [K2A\_U25]

#### Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of other people [7S\_UU, K2A\_K01]
2. Is ready to critically assess the knowledge and content received, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties with solving the problem on its own [P7S\_KK, K2A\_K02]



3. is able to cooperate and work in a group, assuming different roles in it [P7S\_UO, K2A\_K04]
4. is able to properly define the priorities for the implementation of the tasks defined by himself or others [P7S\_UO, K2A\_K05]
5. correctly identifies and resolves dilemmas related to the profession [P7S\_KR, K2A\_K06]
6. is aware of the social role of a technical university graduate, and especially understands the need to formulate and convey to the society, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering activities; makes efforts to provide such information and opinions in a commonly understandable manner [P7S\_KO, K2A\_K08]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Passing the lecture - multiple choice test.

### Programme content

- definitions in the field of scientific research (science, knowledge, research work, methodology, methodology, method),
- research methods in scientific works (experiment, modeling, simulation),
- empirical rather than empirical sciences
- observational and experimental research
- elements of statistics: distribution of variables, measures of dispersion, verification of hypotheses
- scientific works, promotional works (engineering, master's, doctoral, habilitation),
- methodology and construction of scientific work (functional and material sense),
- principles of conducting scientific research (material processing, structure of reporting results, etc.),
- editing of scientific papers.

### Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character

### Bibliography

Basic

1. Leszek W. : Selected methodological issues of empirical research. Ed. Institute of Technology and Exploitation, Radom 2006.
2. Pytkowski W. : Organization of research and evaluation of scientific works. PWN, Warsaw 1985.



### Complementary

1. Cempel C. : Modern issues of research methodology and philosophy. Institute of Sustainable Technologies, Radom - Poznań 2005.
2. Kolman R. : Acquiring knowledge. Branta Publishing House, Bydgoszcz? Gdańsk 2004.
3. Kotarbiński T. : All works. Elements of the theory of knowledge, formal logic and methodology of science. Ossolineum 1990.
4. Leszek W., Wojciechowicz B., Zwierzycki W. : Methodology of generating and implementing research programs in science about the operation of technical objects. Ed. Of the Institute of Sustainable Technologies, Radom - Poznań 2004.
5. Leszek W. : Empirical research. Selected methodological issues. Institute of Sustainable Technologies, Radom 1997.
6. Leszek W. : Non-empirical research procedures in natural and technical sciences. Institute of Sustainable Technologies, Radom 1999.
7. Łobocki M. : Pedagogical research methods. PWN, Warsaw 1984.
8. Mämmelä A. : How to Get a Ph.D. Methods and Practical Hints. In: III Interdisciplinary Technical Conference of Young Scientists, Intertech, Proceedings. Poznan University of Technology, Poznań 2010.
9. Pabis S. : Methodology of empirical sciences. Ed. University of Koszalin University of Technology, Koszalin 2007.
10. Wilson E, Bright J. : Introduction to scientific research. PWN, Warsaw 1968.
11. Wiśłocki K. : Methodology and editing of scientific papers, Wydawnictwo Politechniki Poznańskiej, 2013.
12. Zieleniewski J. : On the organization of scientific research. PWE, Warsaw 1975

### Additional

### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	55	2,0

<sup>1</sup> delete or add other activities as appropriate