



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Methodology of Science for Engineers [N1AiR2>POH12-MNdl]

### Course

Field of study

Automatic Control and Robotics

Year/Semester

4/8

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

elective

### Number of hours

Lecture

20

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr Radosław Kot

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### Lecturers

### Prerequisites

The student has basic knowledge of history and culture; can choose the appropriate sources of knowledge and obtain the necessary information from them and provide a critical analysis and evaluation of solutions for complex and unusual engineering problems; is aware of the need of deepening and expanding knowledge to solve newly born technical problems.

### Course objective

Obtaining knowledge on scientific methodology, the results and limitations of practicing it.

### Course-related learning outcomes

Knowledge:

Has basic knowledge necessary to understand social and ethical, economic, legal and other non-technical conditions of engineering activity; understands the impact of social and civilizational changes on the lifestyle of society.

Skills:

Is able to perceive the scientific aspects of a proper formulating and solving engineering problems,

including environmental, economic and legal ones.

Social competences:

Is aware of the level of his knowledge in relation to the conducted research in science and technology; is able to think and act in a creative and entrepreneurial way, taking into account the safety and ergonomics of work and its economic aspects, is aware of the need to initiate action for the public interest and of responsibility for the effects of the team and its participants work; understands and appreciates the importance of intellectual honesty in the actions of its own and other people; is ready to demonstrate reliability, impartiality, professionalism and ethical attitude; is aware of its social role as a graduate of a technical university, is ready to popularize scientific content to the society and to identify, when met, and resolve basic problems related to the field of study.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Forming grade:

By discussions and questions checking the degree of mastery of previously presented issues.

Final grade:

Final essay on an accepted previously topic.

### Programme content

- Theory of knowledge, methodology and methodology of science.
- Scientific method, methodological procedures.
- Conceptual preparation.
- Hypothesis, theory, falsification.
- Scientific methodology as a cognitive tool and an engineer's work tool.
- Methodological discipline.
- Rules for making the results of scientific work available.
- Prospects for changes in scientific fields.

### Course topics

The use of the scientific method as a condition for recognizing a field as a science. Methodological attitudes: methodology of science and methodologies of specific fields. Methodology and methods of proceeding. Language and operationalization of concepts. Desired level of linguistic precision. Hypothesis construction, scientific and unscientific hypotheses. The falsification process, logic and critical thinking. Science methodology as a cognitive tool and an engineer's work tool. Methodological discipline, innovation and changes in scientific methodology. Rules for making the results of scientific work available, information circulation, information availability, information verification. Popularization of the results of scientific work. Practical problems of modern science: financing, industrial espionage, etc. Scientific thinking and everyday thinking. Science and ethics. Science and ideology, contemporary concepts.

### Teaching methods

Lecture, discussion with students and providing materials of educational importance available on the Web.

### Bibliography

Basic:

1. Apanowicz, J., Metodologia ogólna, Gdynia 2002

Additional:

1. Kumar R., Research Methodology London 2011 [[http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit\\_Kumar-research\\_Methodology\\_A\\_Step-by-Step\\_G.pdf](http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-research_Methodology_A_Step-by-Step_G.pdf) ]
2. Lem S., Summa Technologiae, Kraków 1996

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00