# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Methodology of Science for Engineers [S1AiR1E>POH2-MNdI]

## Course

Field of study
Automatic Control and Robotics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

## Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

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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:
Knows the methods, techniques, tools and materials used in solving simple engineering tasks in the field of automation and robotics [K1_W23 (P6S_WG)].
Has the basic knowledge necessary to understand the non-technical conditions of engineering activities and the process of automation and robotisation in industry and households; knows the basic principles of occupational health and safety in industry [K1_W24 (P6S_WK)].
Knows and understands the basic concepts and principles of industrial property protection and copyright; is

able to use patent information resources [K1_W26 (P6S_WK)].
Skills:
Can communicate using a variety of techniques in professional and other communities [K1_U3 (P6S_UK)].
Can prepare documentation concerning the realisation of an engineering task in Polish and foreign language [K1_U4 (P6S_UW)].
Is able to give a presentation of results on an engineering task in Polish and foreign language [K1_U5 (P6S_UK)].
Has self-education skills to improve and update professional competences [K1_U6 (P6S_UU)].
Is able to perceive non-technical aspects, including environmental, economic and legal aspects when formulating and solving tasks involving the design of automation and robotics systems; is able to contribute to debate - present and evaluate various opinions and positions and discuss them [K1_U16 (P6S_WK)].
Social competences:
Is ready to critically assess his/her knowledge; understands the need for and knows the possibilities of continuous training - improving professional, personal and social competence, is able to inspire and organize the learning process of others [K1_K1 (P6S_KK)].
The graduate is ready to fulfil social obligations and co-organise activities for the benefit of the social environment; is aware of the social role of a graduate of a technical university and understands the need to formulate and convey to the public (in particular through the mass media) information and opinions on the achievements of automation and robotics and other aspects of engineering activities; the graduate makes efforts to communicate such information and opinions in a generally understood manner [K1_K7 (P6S_KO)].

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Forming grade:
By discussions and questions checking the degree of mastery of previously presented issues.
Final grade:
Final essay on an accepted prreviously 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. 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 ]
Additional
1. Lem S., Summa Technologiae, Kraków 1996
2. Lem S., Science Fiction and Futurology

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 60 | 2,00 |
| Classes requiring direct contact with the teacher | 30 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30 | 1,00 |