



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Research Project

### Course

Field of study

Year/Semester

Computing

1/2

Area of study (specialization)

Profile of study

Internet of Things

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

30

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

Speciality supervisors or other delegated employees

email: office\_cs@put.poznan.pl,

tel: 61 6652997

Faculty of Computing and Telecommunications

adres: ul. Piotrowo 2, 60-965 Poznań

### Prerequisites

A student should have basic knowledge of mathematics allowing him/her to formulate and solve complex computer science tasks. Has structured, theoretically grounded general knowledge of algorithms and complexity theory, computer systems architecture, operating systems, networking technologies, programming languages and paradigms, graphics and human-computer communication, artificial intelligence, databases, software engineering, decision support, and embedded systems. Is aware of the trends and the most important new achievements in IT and selected related science disciplines.



He/s should have the ability to employ information and communication techniques used in IT projects, analytical methods, perform simulation studies and experiments to formulate and solve engineering tasks and simple research problems, to formulate and test hypotheses related to engineering/research problems, to integrate knowledge from various areas of computer science, and the ability to acquire information from the indicated sources and to give an oral presentation on specific issues in the field of computer science.

He/s should also understand the need to broaden his/her competencies and be ready to cooperate within the team. Also, in terms of social competencies, the student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

### Course objective

1. Participation of students in scientific research conducted by the Institute of Computer Science of PUT and providing students with basic knowledge on research methods used in the field of computer science to solve selected fundamental problems in various areas of computer science.
2. Developing students' ability to conduct scientific research, including acquiring information from scientific sources, developing students' problem-solving skills regarding selecting appropriate analytical, simulation, and empirical methods to solve scientific problems, and disseminating research results.
3. Developing students' skills to identify appropriate tools for a given research problem.
4. Developing students' social competencies necessary in research teams, teamwork skills, defining and taking various roles in research teams, work organization, and time management.

### Course-related learning outcomes

#### Knowledge

has organized and theoretically grounded general knowledge related to key topics in the field of computer science, the performance of selected solutions, consistency and correctness of selected algorithms (K2st\_W2)

has a theoretically grounded detailed knowledge related to selected topics in the field of computer science, depending on the assigned research problems to be solved (K2st\_W3)

knows development trends and the most important new achievements in computer science and selected related scientific disciplines (K2st\_W4)

has a basic knowledge of the simulation and testing programs life-cycles (K2st\_W5)

knows the fundamental methods, techniques, and tools used to solve complex tasks in the selected area of computer science (K2st\_W6)

has knowledge of ethical codes related to scientific and research work in the field of computer science (K2st\_W7)



### Skills

is able to acquire information from literature, databases and other sources (in the mother tongue and English), integrate them, interpret and critically evaluate them, draw conclusions and formulate and exhaustively justify opinions (K2st\_U1)

can plan and carry out experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions, as well as formulate and verify hypotheses related to complex engineering problems and simple research problems (K2st\_U3)

can use analytical, simulation, and experimental methods to formulate and solve research problems (K2st\_U4)

can assess the usefulness and the possibility of using new achievements (methods and tools) and new IT products (K2st\_U6)

can (e.g., by using new methods) solve complex IT tasks with a research component (K2st\_U10)

is able to prepare and present a report (in Polish and English) presenting the results of scientific research or give an oral presentation on specific topics in the field of computer science; (K2st\_U13)

is able to interact in a team, fulfilling different roles (K2st\_U15)

is able to determine the directions of further learning and implement the process of self-education, also including other people (K2st\_U16)

### Social competences

understands that in computer science, knowledge and skills become obsolete very quickly (K2st\_K1)

understands the importance of using the latest achievements in the field of computer science while solving research and practical problems (K2st\_K2)

understands the importance of popularizing new achievements in the field of computer science (K2st\_K3)

is aware of the need to develop professional achievements and adhere to the professional ethics rules (K2st\_K4)

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- based on the assessment of the current progress of the tasks,
- based on the continuous assessment during each class (oral answers) - rewarding the increase in the ability to use the learned rules and methods,
- based on the ability to manage time when designing and conducting the research study,
- based on the evaluation of the final study report prepared partially during the classes, and partially at home; this assessment also includes the ability to work in a team,



- based on the defense of the report from the study,

Obtaining additional points for activity during classes, especially for:

- discussing the additional aspects of the studied topic,
- the effectiveness of applying the acquired knowledge while solving a given problem.

### Programme content

The program covers the following topics:

1. Performing a literature review in the area of the selected problem.
2. Defining the research problem to be solved, defining the research hypothesis, defining the expected results.
3. Establishing a research team, assigning roles, defining a research project plan,
4. Designing a research study, identifying the required software and hardware tools.
5. Developing the environment for simulation or experiments.
6. Executing experiments, simulations, tests, or other types of research activities. Collecting the research results.
7. Processing and analysis of research results. Visualization of research results. Introducing necessary improvements to the research procedure and re-executing/continue the experiment.
8. Verification of the research hypothesis based on the study results.
9. Preparing a presentation concerning the goals, research method, and results of the study.
10. Writing a paper/report (in Polish or English) concerning the study.

### Teaching methods

Depending on the research group: multimedia presentation, presentation illustrated with examples given on the board, multimedia show, demonstration, performing experiments, discussion, teamwork, case studies.

### Bibliography

Basic

1. Dobre rady dla piszących teksty naukowe, David Lindsay ; przeł. [z ang.] - Wrocław: Politechnika Wroclawska, 1995.
2. Jak pisać prace uniwersyteckie : poradnik dla studentów, Paul Oliver ; przeł. [z ang.] - Kraków : Wydaw. Literackie, 1999.



3. Jak pisać teksty naukowe?, Jolanta Maćkiewicz. - [Wyd.2 poszerz., dodr.]. - Gdańsk: Uniwersytet Gdański, 2001.

Additional

1. Józef Pieter, Ogólna metodologia pracy naukowej, Ossolineum, Wrocław 1967.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Acquiring information from scientific literature, databases, and other sources; development and implementation of experiments, collecting and analyzing results of the studies carried out outside the classroom; preparing and presenting presentations regarding the goals and results of the research; writing report on the conducted research. <sup>1</sup>	20	0,5

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