

## FACULTY OF COMPUTER SCIENCE AND MANAGEMENT / DEPARTMENT...

**SUBJECT CARD****Name in Polish Metodologia badań****Name in English Research Methodology****Main field of study (if applicable): Computer Science****Specialization (if applicable): Computer Engineering****Level and form of studies: 1st/ 2nd\* level, full-time / ~~part-time~~\*****Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~\*****Subject code INZ0151W****Group of courses YES / NO\***

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				
Number of hours of total student workload (CNPS)	90				
Form of crediting	<del>Examination</del> / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	<del>Examination</del> / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1,8				

\*delete as applicable

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

1. None

**SUBJECT OBJECTIVES**

C1 Providing the knowledge of definitions, characteristics and theories of research. Main components in research processes. Types of research. Research in computer science. Criteria for selecting problems for research. Analyzing and formulating the research problem. Literature collecting and review. Definition of the science objectives. Types of research methods. Phases in research process. Methods of measurement.

C2 Educating the abilities of organization of research, research report. Creation of science papers and science presentations.

C3 Acquiring competence in the applying new research methods to contemporary computer engineering.

### SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK\_W01 Student has a widened and deepened knowledge about definitions, characteristics and theories of research. He has a knowledge about analyzing and formulating the research problem, fundamental methods of research, phases in research process, data collection and measurements, writing research proposal, report, paper and preparation of science presentation.

PEK\_W02 Student has a knowledge about methodology of contemporary research in computer science and software engineering.

PEK\_W03 Student knows contemporary trends in applying new research methods to contemporary computer engineering

relating to skills:

PEK\_U01 Student has an ability to understand research process and contemporary research methods. He is able to apply knowledge related to providing science research, collecting and analysis of data, preparing science report, science paper and science presentation.

PEK\_U02 Student is able to identify and to describe science problems and select appropriate method to conduct correct research process.

PEK\_U03 Student is able to select the appropriate method and the algorithm for solving a stated problem with use new research methods to contemporary computer engineering

relating to social competences:

PEK\_K01 Student has competence for solving ethical and society problems related to contemporary research in computer science.

PEK\_K02 Student is able to cooperate and research in group.

### PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction to philosophy of science and research methodology. Short history notes. Cybersemiotics and the question of knowledge. Information dynamics in categorical setting. Quantitative and qualitative methods.	2
Lec 2	Introduction to research. Definitions, characteristics and theories of research. Main components in research processes. Types of research. Research in computer science.	2
Lec 3	Problem identification and topic selection. Criteria for selecting problems for research.	2
Lec 4	Analyzing and formulating the research problem statement.	2
Lec 5	Literature collecting and review. Source of information. Selecting, indexing and verification. Classical and digital libraries. Abstracts and full texts.	2
Lec 6	Definition of the science objectives. Formulation of the research objectives.	2
Lec 7	Fundamental methods of research. Types of research methods. Plan and documentation. Formulate research questions. Data collection. Data processing and analysis. Draw appropriate conclusions. Law and ethical problems.	2
Lec 8	Phases in research process. Components and outline. Types and sources of data for scientific research.	2
Lec	Writing a research proposal. Statement of problem. Study objectives, research	2

9	questions and hypothesis, proposed methods, scope and limitations of study. Literature review. Significance.	
Lec 10	Special role of measurement in research. Strategies. Accuracy and precision of measurements. Nominal, ordinal, internal and ratio levels of measurement.	2
Lec 11	Methods of measurement. Single and multi item measures. Indexing and scaling.	2
Lec 12	Organization of research report. Introduction. Literature part. Theoretical part. Methods chapter. Data analysis part. Discussion part. Conclusions part.	2
Lec 13	Science papers and science presentations. Types of science papers. Scientific writing. Paper preparation, review and publication. Types of presentations. Presentation preparation and presentation. Science and media.	2
Lec 14	Applying new research methods to contemporary computer engineering. New mathematical approach.	2
Lec 15	Final test	2
	Total hours	30
<b>Form of classes – class</b>		<b>Number of hours</b>
Cl 1		
Cl 2		
Cl 3		
Cl 4		
..		
	Total hours	
<b>Form of classes – laboratory</b>		<b>Number of hours</b>
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
...		
	Total hours	
<b>Form of classes – project</b>		<b>Number of hours</b>
Proj 1		
Proj 2		
Proj 3		
Proj 4		
...		
	Total hours	
<b>Form of classes – seminar</b>		<b>Number of hours</b>
Sem 1		
Sem 2		

Sem 3		
...		
	Total hours	

### TEACHING TOOLS USED

N1. Multimedia presentations  
N2. The course Web page  
N3. Electronics and paper books and library references

### EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01-PEK_W03 PEK_U01-PEK_U03	Final test
C=F1		

### PRIMARY AND SECONDARY LITERATURE

#### **PRIMARY LITERATURE:**

- [1] Creswell J.W.: Resarch Design: Qualitative, Quantitative, and Mixed Approaches. Sage Publications 2008.
- [2] Packer M.: The Science of Qualitative Research. Cambridge University Press 2010.
- [3] Kuipers T.A.F.: General Philosophy of Science: Focal Issues. Elseviere 2007.
- [4] Dodig-Crnkovic G. Burgin M.:

#### **SECONDARY LITERATURE:**

- [1] Collins H., Pinch T.: The Golem. What You Should Know about Science. Cambridge University Press 2003.
  - [2] Chalmers A.F.: What is this thing called Science?, Latest ed., Open University Press, (Previous edition can be used if the course leader is informed before the examination.).
  - [3] Denning P.J., et al.: Computing as a Discipline, Communications of the ACM, vol 12, no 1, Jan 1989.
  - [4] Häggglund S. (ed.): Selected term papers on Methodology of Research in Computer Science, Vol II, Lecture Notes, IDA, LiTH, 1997
  - [5] ACM Self Assessment Procedure XXII: Ethics, CACM, vol 33, no 11, November 1990.
  - [6] Kock K.: A Case of Academic Plagiarism. Comm of the ACM, vol 42, no 7, July 1999.
  - [7] Simon H.: Understanding the natural and the artificial worlds, The Sciences of the Artificial, pp 3-29, 3rd printing, 1984.
  - [8] Smith A.J.: The task of the Referee, IEEE Computer, vol 23, no 4, April 1990
- More reading material will be added during the course.
- [9] Sandewall E.: The Methodology of Design Iteration for Systems-oriented Research in Computer Science.  
<http://www.ida.liu.se/ext/caisor/pm-archive/morador/001/index.html>
  - [10] Selected science papers

### SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR  
SUBJECT

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

AND SPECIALIZATION

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
<b>PEK_W01</b>	K2INF_W05	C1-C3	Lec1-Lec14	
<b>PEK_W02</b>	K2INF_W05	C1-C3	Lec1-Lec14	
<b>PEK_W03</b>	K2INF_W05	C1-C3	Lec1-Lec14	
<b>PEK_U01</b>	K2INF_U06	C1-C3	Lec1-Lec14	
<b>PEK_U02</b>	K2INF_U06	C1-C3	Lec1-Lec14	
<b>PEK_U03</b>	K2INF_U06	C1-C3	Lec1-Lec14	
<b>PEK_K01</b>	K2INF_W06, K2INF_U08	C1-C3	Lec1-Lec14	
<b>PEK_K02</b>	K2INF_W06, K2INF_U08	C1-C3	Lec1-Lec14	

\*\* - enter symbols for main-field-of-study/specialization educational effects

\*\*\* - from table above