Wrocław University of Science and Technology
Doctoral School

COURSE CARD

1. Basic information

Course name in English:	Recent research trends in Information and communication technology
Course name in Polish:	Najnowsze kierunki badań w informatyce technicznej i telekomunikacji
Number of hours:	30
Type of course:	Recent research trends in discipline
Form of course:	lecture
Code of course:	W04ITT-SD0047W / ITQ100342W
Course leader:	Prof. Dariusz Król
Faculty of the course leader:	W4 Faculty of Information and Communication Technology
Email address of the course leader:	Dariusz.Krol@pwr.edu.pl

Scientific discipline(s) assigned to the course (doctoral students representing the marked disciplines can participate in the course):	Architecture and urban planning	☐
	Automation, electronic, and electrical engineering	☐
	Information and communication technology	☒
	Biomedical engineering	☐
	Chemical engineering	☐
	Civil engineering and transport	☐
	Mechanical engineering	☐
	Environmental engineering, mining, and energy	☐
	Mathematics	☐
	Chemical sciences	☐
	Physical sciences	☐
	Management and quality studies	☐

2. Objectives

Students will be able to transmit cutting-edge information and promote understanding via explanations of particularly difficult concepts of information and communication technology.
For example, they will be able to apply the scientific methods to real-world situations, to compare and contrast the benefits of qualitative and quantitative research methods, and finally to analyse features and limitations of various sampling procedures and research methodologies in ICT.

3. Content
Detailed information about the course content, including topics and form of classes.

No.	Topic	Number of hours	Form of classes
1	Advanced telecommunications systems (Prof. K. Staniec)	2	lecture
2	Data from satellite sensors: processing and application	2	lecture

	(Dr Anna Kamińska-Chuchmała)		
3	The latest research directions in the field of ICT networks I (Prof. K. Walkowiak)	2	lecture
4	The latest research directions in the field of ICT networks II (Prof. K. Walkowiak)	2	lecture
5	The latest research directions in the field of ICT networks III (Prof. K. Walkowiak)	2	lecture
6	Computational Aspects of Collective Intelligence I (Dr Marcin Maleszka/Prof. Ngoc Thanh Nguyen)	2	lecture
7	Computational Aspects of Collective Intelligence II (Dr Marcin Maleszka/Prof. Ngoc Thanh Nguyen)	2	lecture
8	Affective informatics: tasks (Prof. P. Kazienko)	2	lecture
9	Affective informatics: methods and challenges (Prof. P. Kazienko)	2	lecture
10	Introduction to quantum probability I (Prof. M. Bożejko)	2	lecture
11	Introduction to quantum probability II (Prof. M. Bożejko)	2	lecture
12	Advanced tools and methods of knowledge engineering I (Prof. D. Król)	2	lecture
13	Advanced tools and methods of knowledge engineering II (Prof. D. Król)	2	lecture
14	Lecture by an invited guest (Prof. D. Król)	2	lecture
15	Compendium of the most important developments (Prof. D. Król)	2	lecture

4. Prerequisites

List of prerequisites relating to knowledge, skills and other competences for course participants.

   No obligatory prerequisites beyond the minimum requirements for entrance to the Doctoral School within information and communication technology

5. Learning outcomes

List of learning outcomes at level 8 of the Polish Qualifications Framework assigned to the course (mark the learning outcomes in the last column).

Symbol	Learning outcome	
	KNOWLEDGE. Doctoral student knows and understands:	
SzD_W3	the main trends in the development of the scientific or artistic disciplines covered in the curricula;	☒
SzD_W4	research methodology;	☐
SzD_W5	the rules for the dissemination of scientific results, including in open access mode;	☐
SzD_W6	the fundamental dilemmas of modern civilization;	☒
SzD_W7	the legal and ethical conditions of scientific activity;	☐

SzD_W8	the economic and other relevant conditions of scientific activity;	☐
SzD_W9	basic principles of knowledge transfer to the economic and social spheres and commercialisation of results of scientific activity and know-how related to these results.	☐
	SKILLS. Doctoral student is able to:	
SzD_U2	use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular: - define the purpose and subject of scientific research, formulate a research hypothesis, - develop research methods, techniques and tools, and use them creatively, - draw conclusions on the basis of scientific research; critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development; transfer the results of scientific activities to the economic and social spheres;	☐
SzD_U3	communicate on specialised topics to the extent that they enable an active participation in the international scientific community;	☐
SzD_U4	disseminate research results, including in popular forms;	☐
SzD_U5	initiate debates and participate in a scientific discourse;	☐
SzD_U6	be able to speak a foreign language at B2 level of the Common European Framework of Reference for Languages to a level that enables them to participate in the international scientific and professional environment;	☐
SzD_U7	plan and implement an individual or collective research or creative activity, including in an international environment;	☐
SzD_U8	independently plan and act for one's own development and inspire and organize the development of others;	☐
SzD_U9	plan classes or groups of classes and implement them using modern methods and tools.	☐
	SOCIAL COMPETENCES. Doctoral student is ready to:	
SzD_K3	fulfilling the social obligations of researchers and creators, initiate public interest activities, thinking and acting in an entrepreneurial way;	☐
SzD_K4	maintaining and developing the ethos of research and creative environments, including: - carrying out scientific activities in an independent manner, - respecting the principle of public ownership of research results, taking into account the principles of intellectual property protection.	☐

6. Evaluation

Short description of the method(s) used to evaluate the learning outcomes assigned to the course, e.g., exam, test, report, presentation, etc.

Exam in the form of a test

7. Teaching methods

Short description of the teaching methods used during the course, e.g., multimedia presentation, discussion, literature studies, developing written documents, own work, etc.

Lecturer presents material and answers student questions that arise using multimedia presentation, literature studies, debriefing a mini case study, solve a problem, correct the error, compare and contrast.

8. Literature

List of primary and secondary literature used to prepare the course and including additional knowledge for participants, e.g., books, textbooks, research papers, standards, web pages, etc.

1. Afriliana, N., Król, D., Gaol, F.L. "Computational Intelligence Techniques for Assessing Data Quality: Towards Knowledge-Driven Processing", 2021, 12744 LNCS, pp. 392–405.
2. Cowen A.S., Keltner D.: Self-report captures 27 distinct categories of emotion bridged by continuous gradients. PNAS, 2017, 114 (38) E7900-E7909.
3. Dzieżyc M., Gjoreski M., Kazienko P., Saganowski S., Gams M.: Can we ditch feature engineering? End-to-End Deep Learning for Affect Recognition from Physiological Sensor Data. Sensors, 2020, 20(22), 6535.
4. Ikram, M.; Sultan, K.; Lateef, M.F.; Alqadami, A.S.M. A Road towards 6G Communication—A Review of 5G Antennas, Arrays, and Wearable Devices. Electronics 2022, 11, 169.
5. Milkowski P., Gruza M., Kanclerz K., Kazienko P., Grimling D., Kocoń J.: Personal Bias in Prediction of Emotions Elicited by Textual Opinions. ACL-IJCNLP 2021, ACL, 2021, 248–259.
6. Motro D., Ye B., Kugler T., Noussair C.N. : Measuring Emotions in the Digital Age. MIT Sloan management Review, November 20, 2019.
7. Pucher, S., Król, D., "A quality assessment tool for koblenz datasets using metrics-driven approach", 2020, 12144 LNAI, pp. 747–758.
8. Sina Ghassemi, Attilio Fiandrotti, Gianluca Francini, and Enrico Magli, Learning and Adapting Robust Features for Satellite Image Segmentation on Heterogeneous Data Sets, IEEE Transactions on Geoscience and Remote Sensing, 2019.
9. Solberg Søilen, Klaus. "Making sense of the collective intelligence field: A review."Journal of Intelligence Studies in Business9.2 (2019): 6-18.
10. Suran, Shweta, VishwajeetPattanaik, and DirkDraheim. "Frameworksfor collectiveintelligence: A systematicliteraturereview." ACM Computing Surveys(CSUR) 53.1 (2020): 1-36.
11. Talukdar, S.; Singha, P.; Mahato, S.; Shahfahad; Pal, S.; Liou, Y.-A.; Rahman, A. Land-Use Land-Cover Classification by Machine Learning Classifiers for Satellite Observations—A Review. Remote Sens. 2020, 12, 1135.

9. Other remarks

Additional remarks, comments, (e.g., language of the course)

The order of lectures could be rearranged. The lectures might be remotely operated. Before every event the lecturer will send you link for the meeting.