Wrocław University of Science and Technology
Doctoral School

COURSE CARD

1. Basic information

Course name in English:	Chatbot – a modern researcher's tool
Course name in Polish:	Chatbot – współczesne narzędzie badacza
Number of hours:	15
Type of course:	Elective course
Form of course:	mixed forms (combination of lecture, seminar and laboratory)
Code of course:	
Course leader:	*Dr inż. Jakub Klikowski*
Faculty of the course leader:	W4 Faculty of Information and Communication Technology
Email address of the course leader:	jakub.klikowski@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, electrical engineering and space technologies	☒
	Information and communication technology	☒
	Biomedical engineering	☒
	Chemical engineering	☒
	Civil engineering, geodesy and transport	☒
	Materials engineering	☒
	Mechanical engineering	☒
	Environmental engineering, mining, and energy	☒
	Mathematics	☒
	Chemical sciences	☒
	Physical sciences	☒
	Management and quality studies	☒

2. Objectives

 The main objective of this course is to learn basic and advanced techniques that allow the practical use of chatbots in everyday research work, considering legal and ethical aspects. In addition, PhD students will learn how dialogue systems based on large language models work and how such systems are designed. During the laboratory classes, students will learn practical tools and understand the importance of critical thinking and responsible application of AI in scientific work. Additionally, they attempt to customize the selected chatbot for their own needs, and during the seminar, they will present the effects of this realization.

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

No.	Topic	Number of hours	Form of classes
1	Introduction to chatbots and large language models in scientific research	3	lecture
2	Configuration of the local chatbot working environment	2	laboratory
3	Basic and advanced prompt engineering techniques	2	laboratory
4	Chatbot in supporting literature review and generating research ideas	2	laboratory
5	Chatbot in supporting basic data analysis with self-generated code	2	laboratory
6	Work in groups on an individual research project using a chatbot	2	laboratory
7	Presentation of projects and discussion	2	seminar
8			Select form
9			Select form
10			Select form
11			Select form
12			Select form
13			Select form
14			Select form
15			Select form

4. Prerequisites

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

No additional requirements.

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.

The final evaluation comes from the laboratory work and presentation assessments.

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.

Multimedia presentation, discussion, consultations during laboratory classes, own work.

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. Stokel-Walker, Chris. "ChatGPT listed as author on research papers: many scientists disapprove." *Nature* 613.7945 (2023): 620-621.
2. Thorp, H. Holden. "ChatGPT is fun, but not an author." *Science*379.6630 (2023): 313-313.
3. Kooli, Chokri. "Chatbots in education and research: A critical examination of ethical implications and solutions." *Sustainability*15.7 (2023): 5614.
4. Messeri, Lisa, and M. J. Crockett. "Artificial intelligence and illusions of understanding in scientific research." *Nature*627.8002 (2024): 49-58.
5. Ge, Yingqiang, et al. "Openagi: When llm meets domain experts." *Advances in Neural Information Processing Systems*36 (2024).
6. Li, Junyi, et al. "Halueval: A large-scale hallucination evaluation benchmark for large language models." *Proceedings of the 2023 Conference on Empirical Methods in Natural Language Processing*. 2023.

9. Other remarks

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