COURSE CARD

1. Basic information

Course name in English:	Research skills
Course name in Polish:	Warsztat badacza
Number of hours:	30
Type of course:	Research skills
Form of course:	mixed forms (combination of lecture, seminar and laboratory)
Code of course:	**W03INC-SD0088W / CIQ100379W**
Course leader:	Prof. dr hab. Inż. W. Andrzej Sokalski
Faculty of the course leader:	W3 Faculty of Chemistry
Email address of the course leader:	sokalski@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

Introductory course for beginning PhD students from all departments delivered since 1995. Course focuses on systematic retrieval and critical evaluation of scientific information from literature, patent, dissertation and research grant databases. Composing database search queries. Writing and editing research papers, selection of most appropriate journals, correspondence with editors and reviewers. Preparing grant, fellowship or conference support applications. Career planning. Arranging international and interdisciplinary collaborations. Searching best experts, research centers for individual training, job and postdoctoral fellowship offers. Writing CV and preparing for interview. Avoiding ethical problems in science. Use of factographic databases and resources of national supercomputer centers. Course grading is based on the quality of report containing critical evaluation of various kinds of information (reviews, books, experts, patents, grants, job offers, conferences, etc.) related to the topics of individual PhD thesis.

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

No.	Topic	Number of hours	Form of classes
1	Introduction. Explanation of course goals. Setting computer accounts	2	lecture
2	Structure and composition of research paper, manuscript preparation, correspondence with editors and answering reviewer and editor questions	2	lecture
3	Systematic following of scientific literature, composing search queries. Current Contents database.	2	lecture
4	Citation databases, Web of Knowledge, Scopus, Google Scholar. Quality of research papers	2	lecture
5	Available forms of research funding, searching grant databases, preparing grant applications	2	lecture
6	Preparing posters or oral communications, attending conferences	2	lecture
7	writing CV, serarching fellowships and jobs offers, preparing for interview, career planning, arranging international or interdisciplinary cooperation	2	lecture
8	Ethical problems in science, parasitic journals and conferences	2	lecture
9	Patent and dissertation databases, preparing dissertation, looking for breakthrough research topics	2	lecture
10	Use of factographic databases (Reaxys, Scifinder)	2	lecture
11	Use of factographic databases (Cambridge Structural Database) and supercomputer center	2	lecture
12	Short presentation of individual research topics with discussion	2	seminar
13	Short presentation of individual research topics with discussion	2	seminar
14	Short presentation of individual research topics with discussion	2	seminar
15	Consultations related to reports, corrections and grading final reports	2	project

4. Prerequisites

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

 Basic computer skills, communication in English language, predefined topics of PhD thesis

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.

a) Report with critically evaluated answers related to prospective PhD thesis topics obtained using available literature and factographic databases,
b) short multimedia presentation introducing planned research topics for general public,
c) preliminary version of Individual Research Plan

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.

Lecture and seminar with short discussion

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. D. Lindsay, A guide to scientific writing, Longman, 1984

2. D. Ridley, Finding scientific information –information retrieval, Wiley, 2002

3. M. Carter, Designing Science Presentations, Academic Press, 2013

4. On Being Scientist: A Guide to Responsible Conduct in Research: Third Edition,

   National Academy of Sciences (2009)

5. M. Heller, Jak być uczonym, Znak, 2013
6. N. Hertz, Eyes wide open, Harper Collins, 2013

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