

Doctoral program

General characteristics of doctoral studies	
Unit of leading doctoral studies:	Faculty of Biology and Environmental Protection Faculty of Chemistry Faculty of Languages Faculty of Physics, Astronomy and Informatics Faculty of Mathematics and Computer Science Faculty of Economic Sciences and Management Faculty of History Faculty of Earth Sciences Faculty of Education Faculty of Fine Arts Faculty of Theology
Name of the doctoral studies:	Interdyscyplinarne Studia Doktoranckie „Academia Copernicana”
Name of the doctoral studies in English:	Interdisciplinary PhD School „Academia Copernicana”
Fields of studies: -area of knowledge: -science/art: -discipline of science/art:	<p>The discipline of science group</p> <p><u>The area of natural sciences</u></p> <p>the field of biological sciences the discipline of biology</p> <p>the field of Earth Sciences the discipline of geography</p> <p><u>Area of science</u></p> <p>field of chemical sciences</p>

the discipline of chemistry

the field of physical sciences

the discipline of physics

the discipline of astronomy

the discipline of biophysics

the field of mathematical sciences

discipline of mathematics

Discipline of the humanities group

The area of the social sciences

the field of economic sciences

the discipline of economy

discipline of finance

the discipline of management

the field of social sciences

the discipline of education

The area of the Humanities

the field of humanities

the discipline of literary studies

the discipline of linguistics

the discipline of archaeology

the discipline of library and information science

the discipline of history

theological sciences area

The lack of theological sciences disciplines

	<u>Area arts</u> the field of fine art discipline of conservation and restoration discipline of fine arts
ISCED Code:	
Number of semesters:	8
The total number of ECTS credits:	35
The objective of doctoral studies:	The primary goal of interdisciplinary doctoral studies is to prepare the students for: -the autonomous design of a research project, -the development of a research task and a schedule -the widening of the research toolbox, -the implementation of own studies, -a critical assessment of the results and their interpretation, -a summary of the results of the research in the form of a dissertation, -the preparation of scientific publications, -the preparation of proposals for research projects -active participating scientific discussions, -preparing and conducting high school teaching.

Training modules along with the anticipated effects of education

Training modules[3]	Type of activities	Number of ECTS credits	Expected outcomes	PRK description component code-level 8	How to verify and evaluate the intended learning outcomes achieved by the candidate
Module I Preparing to conduct research activities					
Successful grant application - 2 groups of scientific disciplines:* science	tutorial	1	<p>Students:</p> <ul style="list-style-type: none"> • know and understand sources of inspirations for the development of their research fields; • understand basic concepts in their research areas; • know and understand rules for acquiring external funding for research; • know ethical rules and good practice in carrying out research; <p>The course should lead to development of the following outcomes: K_W01, K_W02, K_W03, K_W05, K_W06.</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • use knowledge developed in various research fields in identifying and formulating innovative ideas; • define the key goals of a research project and formulate a research hypothesis, • select appropriate research techniques and methodologies in planning a research project, • express their research ideas in the form of short summary, abstract, graphical item, • recognize costs of research and prepare the 	P8S_WK P8S_UW P8S_KK	<p>graded credit: Miniatura, Preludium or other application</p> <p>Assessment will be based on draft (essential fragments) research proposals prepared for Miniatura and Preludium competitions offered by the National Science Center. Completion of the course requires submitting all of the writing assignments, which include Miniatura application, Preludium project summary, Preludium cost calculation, Preludium short description.</p>

		<p>budget;</p> <p>The course should lead to development of the following outcomes: K_U01, K_U02, K_U03</p> <p>Students are:</p> <ul style="list-style-type: none"> • aware of the progress in the research field of their interest; • able to critically analyze the results of their own work and are able to place their own work in the broad research context; • able to analyze and assess available information to understand possible implications of the knowledge gained; • trained to understand the need to follow scientific literature to catch up with rapid progress in this field; • capable of respecting the IP ethical rules in application to research results. <p>The course should lead to development of the following outcomes: K_K01, K_K02, K_K03, K_K07.</p>		
humanities	tutorial	<p><i>1</i></p> <p>Student:</p> <ul style="list-style-type: none"> - W02: indicates and describes the main development trends of the scientific or artistic discipline being practiced -W05: discusses the principles of obtaining and accounting for funds for the implementation of scientific projects in the field of scientific or artistic discipline - W07: knows the legal basis for the functioning of science <p>Student:</p> <ul style="list-style-type: none"> - U02: is able to define the purpose of the research project and formulate the research hypothesis - U03: is able to select the appropriate research methods when planning the research within the selected specialization and use them to carry out 	P8S_WK P8S_UW P8S_KK	Assessment methods: presence and activity during classes – credit without assessment

			<p>the research on its own -U07: independently plans its development and supports others in this regard Student: – K01: critically evaluate the achievements of the represented scientific or artistic discipline – K02: critically analyzes the results of own research and research of other authors and is aware of the necessity to undertake activities that increase the value of research and increase the efficiency of work -K03: is aware of the importance of knowledge in solving cognitive problems</p>		
Legal foundations of science	lecture	1	K_W07, K_K07	P8S_WK P8S_KR	graded credit: final test
Ethics and intellectual property	lecture	1	K_W06, K_K06	P8S_WK P8S_KR	graded credit: final test
History of scientific thinking	lecture	1	K_W01, K_W02	P8S_WG	graded credit: final test
Informatics, data bases and scientific data acquisition	tutorial	1	<p>Student W1: has basic and systematized knowledge of databases important for scientific activity W2: Is familiar with technical possibilities of WWW and supercomputers W3: has basic knowledge on artificial intelligence and machine learning in big data era W4: has working knowledge of methods of acquisition of scientific data Student U1: is critically alerted with respect to quality of data U2: knows how to find reliable sources of information in his/her field U3: is prepared to use Web of Science, Google Scholar and similar databases U4: knows how to assess statistical value of simple data Student K1: understands the significance the importance of regular checking contents of scientific databases in her/his research field K2: understands the need for maintaining www based databases</p>	P8S_WG P8S_UW P8S_KK	<p>Assessment methods: np. - written examination (test) - W1-W4 fail- <10 pts (<50%) satisfactory 10-12 pts (50-59%) satisfactory plus- 13-14 pts (60-69%) good – 14-15 pts (70-79%) good plus- 16-17 pts (80-89%) very good- 18-20 pts (90-100%)</p>

			<p>K3: appreciates the role of data sharing in science</p> <p>K4: is aware of peer review system</p> <p>K5: is ready to cooperate in team to share information</p> <p>K6: is encouraged to work voluntarily for the benefit of scientific community</p>		
<p>Applied data analysis and statistics - tutorial 30 h - 2 groups of scientific disciplines:*</p> <p>science</p>		2			
	tutorial	2	<p>Student</p> <p>W1: knows main issues and methods of statistics, for instance confidence intervals and hypothesis testing – K_W03,</p> <p>W2: knows main data analysis algorithms relating to regression and classification– K_W03.</p> <p>Student</p> <p>U1: is able to construct confidence intervals and verify statistical hypotheses adequately to a given problem - K_U03, K_U04,</p> <p>U2: is able to apply appropriate data analysis algorithms to given data sets - K_U03, K_U04.</p> <p>U3: can draw correct conclusions from data analysis - K_U04.</p> <p>Student</p> <p>K1: can formulate problems concerning statistics and data analysis in a clear way K_K03,</p> <p>K2: understands the significance of statistics and data analysis in solving practical problems – K_K02, K_K03.</p>	<p>P8S_WG</p> <p>P8S_UW</p> <p>P8S_KK</p>	<p>Assessment methods:</p> <p>- written examination- W1, W2, U1, U2,U3, K1, K2.</p> <p>Assessment criteria:</p> <p>the final grade will be determined on the following basis:</p> <p>fail- 0-49 pts (0-49%)</p> <p>satisfactory- 50-59 pts (50-59%)</p> <p>satisfactory plus- 60-69 pts (60-69%)</p> <p>good – 70-79 pts (70-79%)</p> <p>good plus- 80-89 pts (80-89%)</p> <p>very good- 90-100 pts (90-100%)</p>
	humanities	tutorial	2	<p>Student:</p> <p>W1: knows main issues and methods of statistics, for instance confidence intervals and hypothesis testing – K_W03,</p> <p>W2: knows main data analysis algorithms relating to regression and classification– K_W03.</p> <p>Student:</p> <p>U1: is able to construct confidence intervals and verify statistical hypotheses adequately to a given problem - K_U03, K_U04,</p>	<p>P8S_WG</p> <p>P8S_UW</p> <p>P8S_KK</p>

			U2: is able to apply appropriate data analysis algorithms to given data sets - K_U03, K_U04. U3: can draw correct conclusions from data analysis - K_U04. Student: K1: can formulate problems concerning statistics and data analysis in a clear way K_K03, K2: understands the significance of statistics and data analysis in solving practical problems – K_K02, K_K03.		good plus- 80-89 pts (80-89%) very good- 90-100 pts (90-100%)
Evolutionary biology	tutorial	1	W1: has basic knowledge of the recent scientific literature – K_W01 W2: has basic knowledge in the history of life – K_W01 W3: has basic knowledge in the mechanisms of evolutionary change including the evolution of man – K_W02 W4: possesses knowledge of the scientific and philosophical implications of evolutionary theory – K_W04 K1: understands the biological significance of evolutionary biology – K_K03 K2: understands the importance of evolutionary biology in biological and medical research – K_K03	P8S_WG P8S_WK P8S_KK	- written examination fail- <6 pts (<40%) satisfactory- 6-9 pts (40-55%) satisfactory plus- 9.5 pts (65%) good – 10-13 pts (66-87%) good plus- 13.5 pts (87%) very good- >13 pts (>87%)
International summer schools - tutorial 90 h (2 groups of scientific disciplines: science and humanities *)	tutorial	9	K_W01, K_W02, K_W03, K_W04, K_U01, K_U02, K_U03, K_U04, K_U06, K_U07, K_K01, K_K02, K_K03, K_K04, K_K05	P8S_WG P8S_WK P8S_UW P8S_UO P8S_UK P8S_UU P8S_KK P8S_KO	graded credit: final project
Module II Current developments and achievements in the selected basic scientific discipline					
Current scientific achievements - 2 groups of scientific disciplines:* science		1			graded credit: final test
	discussion seminar	1	K_W01, K_W02, K_W03, K_W04, K_K01, K_K02, K_K03, K_K06, K_K07	P8S_WG P8S_WK P8S_KK	

humanities				P8S_KR	
	discussion seminar	1	K_W01, K_W02, K_W03, K_W04, K_K01, K_K02, K_K03, K_K06, K_K07	P8S_WG P8S_WK P8S_KK P8S_KR	
Artificial intelligence and the future of scientific thinking	tutorial	1	<p>Student knows and understands:</p> <ul style="list-style-type: none"> * artificial intelligence goals, relations to other fields of science; * sources of inspirations for the development of the field; * understands basic concepts in this area; * understands possible applications and social consequences of AI; * is able to critically assess AI news in media, * knows basic heuristic methods used in AI for problem solving; * knows basic methods of knowledge representations and inference schemes; * understands challenges and methods applied to natural language processing; * knows basic principles of expert systems and their possible use; * understands the potential of AI methods for scientific research in various domains. <p>The course should lead to development of the following outcomes: K_W01, K_W02, K_W03, K_W04, K_W05, K_W06, K_W07.</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • Find and critically assess information in the Internet and in scientific and popular science journals related to the AI; • summarize main points of the lectures, • collect and interpret information from different sources, • formulate important questions and think about implications of learned material, • recognize false assumptions about AI that are quite common; • find interesting AI tools that may be used to help in scientific research. 	P8S_WG P8S_UW P8S_KK	Written examination consisting of 10 test questions, 100 points. Fail <50, and [51-60] for 3, [61-70] for 3.5, [71-82] for 4, [83-90] for 4.5, and [91-100] for 5.

			<p>The course should lead to development of the following outcomes: K_U01, K_U02, K_U04, K_U06</p> <p>Students are:</p> <ul style="list-style-type: none"> •aware of the complexity of issues related to artificial intelligence; •understand the needs to include cognitive and brain sciences in studying AI; •analyze and assess available information to understand possible implications of the knowledge gained; •understand the need to follow scientific literature to catch up with rapid progress in this field; •understand ethical and social problems created by the widespread introduction of AI. <p>The course should lead to development of the following outcomes: K_K01, K_K02, K_K03, K_U08, K_U09, K_U11.</p>		
Module III Skills associated with the presentation of scientific research					
Scientific data presentation and copyright I	tutorial	2	<p>Student</p> <p>W1: has basic knowledge about practical issues related to the different scientific approaches used in the environmental sciences – K_W01, K_W02, K_W03</p> <p>W2: has basic knowledge about procedures of scientific data analysis and presentation – K_W02, K_W03</p> <p>W3: is familiar with the ethical and legal issues in the scientific communication – K_W06</p> <p>Student</p> <p>U1: has basic skills in written, oral and visual scientific communication – K_U01, K_U02, K_U05, K_U06</p> <p>U2: is able to actively participate in class discussions, critically evaluate presentations and visual information – K_U01, K_U07</p> <p>U3: can use different scientific research designs</p>	<p>P8S_WG P8S_WK P8S_UW P8S_UK P8S_UK P8S_UU P8S_KK</p>	<p>Assessment methods:</p> <p>Final grade determined on the basis of results of the following components of passing requirements: paper draft - 70% (W1, W2, W3, U1, U2, U3, K1, K2, K3).</p> <p>Assignment/practical tasks (short oral and poster presentations) – 30% (W1, W2, W3, U1, U2, U3, K1, K2, K3)</p> <p>Assessment criteria:</p> <p>2.0 – below 51%</p> <p>3.0 – 51%-59.9%;</p> <p>3.5 – 60%-69.9%;</p> <p>4.0 – 70%-79.9%;</p> <p>4.5 – 80%-89.9%;</p> <p>5.0 – 90% - 100%</p>

			and methods – K_U01, K_U02, K_U07 Student K1: is ready to conduct research characterized by scientific integrity, truthfulness, and accountability – K_K01, K_K02, K_K03, K_K06, K_K07 K2: identifies bad scientific practice - K_K06, K_K07 K3: is able to work in group - K_K04, K_K06		
Scientific data presentation and copyright II, III, IV	tutorial	3	W1: has basic knowledge about practical issues related to the different scientific approaches used in the environmental sciences – K_W01, K_W02, K_W03 W2: has basic knowledge about procedures of scientific data analysis and presentation – K_W02, K_W03 W3: is familiar with the ethical and legal issues in the scientific communication – K_W06 Student U1: has basic skills in written, oral and visual scientific communication – K_U01, K_U02, K_U05, K_U06 U2: is able to actively participate in class discussions, critically evaluate presentations and visual information – K_U01, K_U07 U3: can use different scientific research designs and methods – K_U01, K_U02, K_U07 K1: is ready to conduct research characterized by scientific integrity, truthfulness, and accountability – K_K01, K_K02, K_K03, K_K06, K_K07 K2: identifies bad scientific practice - K_K06, K_K07 K3: is able to work in group - K_K04, K_K06	P8S_WG P8S_WK P8S_UW P8S_UK P8S_UK P8S_UU P8S_KK	graded credit: paper draft
Module IV Educational activities with students					
The art of teaching	Lecture tutorial	5	K_W01, K_W02, K_U08, K_K04, K_K05, K_K06, K_K07	P8S_WG P8S_UU P8S_KO P8S_KR P8S_KR	Lecture: graded credit: final test; tutorial: ocean przygotowanego scenariusz zajęć
Module V					

Doctoral exam preparation with an additional discipline					
Interdisciplinary monograph	Lecture	3	K_W01, K_W02, K_W03, K_W04, K_K01, K_K02, K_K03	P8S_WG P8S_WK P8S_KK	graded credit: final test
Practice					
Educational activities with students		3			Lecture observation activities scored by the promoter
Total:		35			

* the student selects according to the scientific discipline of his doctoral thesis; science: biology, geography, chemistry, physics, astronomy, biophysics, mathematics; humanities: economy, finance, management studies, education, literary studies, linguistics, archaeology, library and information science, history, theological science, fine arts, conservation and restoration.