Appendix No. 1
To the Programme of study at the Doctoral School of Natural and Agricultural Sciences

Learning outcomes at the Doctoral School of Natural and Agricultural Sciences

Table 1. Universal Polish Qualifications Framework (PQF) level descriptors – Level

Qualification category	**Descriptors**	**Aspects of fundamental importance**	**Polish Qualifications Framework second stage descriptors – Level 8**	**Descriptor code**
Knowledge	Depth and scope	Completeness of cognitive perspective and dependencies	**Knows and understands:** 1. to an extent enabling revision of the existing paradigms – the world's achievements including: • theoretical foundations, • general and selected specific issues relevant for the scientific or artistic discipline; 2. key development trends in the scientific or artistic disciplines relevant for the programme of study; 3. methodology of research; 4. rules for dissemination of research findings, also on an open access basis.	P8S_WG
Knowledge	Context	Determinants, effects	**Knows and understands:** 1. fundamental dilemmas faced by the contemporary civilisation; 2. economic, legal and other relevant determinants of research activity; 3. basic rules governing transfer of knowledge to the economic and social domain, and commercialisation of research findings and of related know-how.	P8S_WK

Skills	Utilisation of knowledge	Problems solved and tasks carried out	**Is able to:** 1. utilise knowledge in various fields of science or art in order to creatively identify, formulate and solve in an innovative manner complex problems or carry out research tasks, and in particular: • to define the purpose and subject-matter of research, formulate research hypothesis, • to develop research methods, techniques and tools, and apply the same in a creative manner, • draw conclusions based on research findings; 2. carry out a critical analysis and assessment of research findings, expert activity and other works of creative nature, and of the contribution thereof to development of knowledge; 3. transfer research findings to the economic and social domain.	P8S_UW
Skills	Communication	Understanding and formulating statements, disseminating knowledge in the scientific community, using a foreign language	**Is able to:** 1. communicate on specialist topics at a level enabling active participation in the international scientific community; 2. disseminate research findings, also in popular science forms; 3. initiate a debate, participate in a scientific discourse; 4. use a foreign language on B2 Level under the Common European Framework of Reference for Languages with sufficient proficiency to enable participation in the international scientific and professional community.	P8S_UK
Skills	Work organisation	Planning and team work	**Is able to:** plan and implement both individual and team's research or creative project, also within an international community.	P8S_UO
Skills	Learning	Planning one's personal development and development of	**Is able to:** 1. autonomously plan and act to the benefit of their own development as well as inspire and arrange for development of other people;	P8S_UU

		other people	2. plan a course or groups of courses and deliver the same using modern methods and tools.	
Social competence	Evaluation	Critical assessment	**Is ready to:** 1. provide a critical assessment of the achievements in the scientific or artistic discipline represented; 2. provide a critical assessment of their own contribution to a development of such a discipline; 3. recognise the importance of knowledge for the solution of cognitive and practical problems.	P8S_KK
Social competence	Responsibility	Complying with social responsibilities, acting for the public interest	**Is ready to:** 1. comply with the social responsibilities of researchers and authors; 2. initiate activities in the public interest; 3. think and act in an entrepreneurial manner.	P8S_KO
Social competence	Professional role	Independence and development of ethos	**Is ready to:** uphold and develop the ethos of research and artistic communities, including to: • conduct research in an independent manner; • respect the principle of public ownership of research findings subject to the rules governing protection of intellectual property.	P8S_KR

Table 2. Assumed learning outcomes at the Doctoral School of Natural and Agricultural Sciences with respect to PQF8.

Outcome code	Graduate's learning outcomes	Manner of attainment of the learning outcomes	Methods of assessment of the learning outcomes	PQF descriptor code reference
W01	Demonstrates advanced general knowledge in the field of biological sciences, agriculture and horticulture, animal production and fisheries science, and related sciences, as well as in their own subject area of research and doctoral dissertation, which the graduate is able to develop and apply creatively in their research activity.	1. Autonomous acquisition of knowledge, work with the doctoral dissertation supervisor. 2. Participation in courses provided for in the programme of study. 3. Participation in the Scientific Reporting Session (SRS).	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Requirements set forth in the programme of study. 3. Attendance and oral presentation delivered at SRS.	P8S_WG
W02	Demonstrates detailed knowledge including the most recent research achievements in the subject area related to their research; knowledge of scientific publications in the field covered by their research.	1. Autonomous acquisition of knowledge, work with the doctoral dissertation supervisor. 2. Participation in courses provided for in the programme of study. 3. Participation in the scientific community's life.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Requirements set forth in the programme of study. 3. Documented active participation.	P8S_WG
W03	Demonstrates interdisciplinary knowledge; awareness and understanding of interdependencies between various disciplines, which enables cooperation with specialists representing various subject areas.	1. Autonomous acquisition of knowledge, work with the doctoral dissertation supervisor. 2. Participation in courses provided for in the programme of study. 3. Participation in the scientific community's life.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Requirements set forth in the programme of study. 3. Documented active participation.	P8S_WG
W04	Demonstrates knowledge and understanding of civilisation-induced	1. Autonomous acquisition of knowledge, work with the	1. Assessment of the work and progress by the doctoral	P8S_WK

	threats to natural environment, including ones induced by technologies applied in agriculture and horticulture; and knows examples of how to prevent consequences thereof.	doctoral dissertation supervisor. 2. Participation in courses provided for in the programme of study. 3. Participation in the scientific community's life.	dissertation supervisor. 2. Requirements set forth in the programme of study. 3. Documented active participation.	
W05	Explains selected general philosophy issues and issues relevant for life scientists.	1. Participation in lectures/seminars. 2. Participation in courses provided for in the programme of study. 3. Participation in the scientific community's life.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Requirements set forth in the programme of study. 3. Documented active participation.	P8S_WK
W06	Demonstrates knowledge of the research methods and tools necessary for the solution of research problems (in a laboratory and on site), including methods of statistical analysis.	1. Autonomous acquisition of knowledge, work with the doctoral dissertation supervisor. 2. Participation in courses provided for in the programme of study. 3. Participation in the scientific community's life.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Requirements set forth in the programme of study. 3. Documented active participation.	P8S_WK
W07	Knows the rules of preparation of scientific publications, oral presentations and posters showing research findings, and the importance of such scientific evidence; knows the principal methods of review of scientific publications	1. Autonomous acquisition of knowledge, work with the doctoral dissertation supervisor. 2. Participation in SRS. 3. Active participation in the scientific community's life.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Attendance and oral presentation delivered at SRS. 3. Documented active participation.	P8S_WK
W08	Demonstrates basic knowledge of	1. Autonomous acquisition of	1 Assessment of the work and	P8S_WK

	the rules for obtaining funding for research from various sources; knows the rules for evaluation of research projects; and has basic knowledge of legal and ethical determinants of research activity and researcher's work.	knowledge, work with the doctoral dissertation supervisor. 2. Participation in lectures, seminars and workshops. 3. Participation in courses provided for in the programme of study.	progress by the doctoral dissertation supervisor. 2 Documented active participation.	
W09	Demonstrates basic knowledge of a transfer of knowledge to the economic and social domain, and on commercialisation of research findings	1 Autonomous acquisition of knowledge, work with the doctoral dissertation supervisor. 2 Participation in lectures, seminars and workshops.	1 Assessment of the work and progress by the doctoral dissertation supervisor. 2 Documented active participation.	P8S_WK
U01	Is able to utilise their knowledge of the state of the art in their field of study to put forward their own research hypotheses, design an experiment and select appropriate methods for it.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Active participation in the scientific community's life. 3. Preparation of a doctoral dissertation.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation. 3. Doctoral dissertation.	P8S_UW
U02	Has the ability to draw conclusions from their own research when confronted with the findings of other researchers, and to carry out a critical analysis thereof.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Active participation in the scientific community's life (sessions, conferences, workshops, seminars). 3. Preparation of a doctoral dissertation.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation. 3. Doctoral dissertation.	P8S_UW

U03	Is able to prepare and present (using modern methods) as well as discuss their findings within and outside the scientific community; is able to obtain information related to research activity, communicate with specialists in the discipline studied as well as with specialists representing other subject areas and disciplines, both in their native and foreign languages; is able to utilise their knowledge to search for, analyse, assess, select and integrate information from various sources, and formulate critical judgments based thereon.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Preparation of a scientific paper for publication. 3. Active participation in the scientific community's life, presentation of science to the society.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Published scientific paper. 3. Documented active participation.	P8S_UK
U04	Is able to plan and carry out research falling within the scope of their interests; demonstrates the ability to manage the work of a research team and cooperate with other research teams.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Preparation of a doctoral dissertation.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Doctoral dissertation.	P8S_UO
U05	Is able, autonomously and using appropriate methods, to communicate knowledge to and develop skills of various audience groups; demonstrates the ability to present their scientific achievements in scholarly discussions; has the ability to provide arguments,	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Participation in the scientific community's life. 3. Presentation of science to the society.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation.	P8S_UU

	formulate their own original opinions, draw conclusions, and arrive at problem syntheses.			
K01	Understands and feels the need for continued enhancement of their professional competences, in particular in their own scientific discipline.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Participation in the scientific community's life. 3. Presentation of science to the society.	1 Assessment of the work and progress by the doctoral dissertation supervisor. 2 Documented active participation.	P8S_KK
K02	Demonstrates a critical approach both to their own and other people's research work; is aware of the level and originality of their own research concepts, the ability to implement a research project, the level of creativity and relevance of their own contribution to development of the scientific discipline studied; demonstrates creativity in the search for new areas of research and in management of the course of such research, and actively participates in scientific communication.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Participation in the scientific community's life. 3. Preparation of a public defence of a doctoral dissertation.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation.	P8S_KK
K03	Works in research teams showing respect for the work and experience of other team members; understands the need to disseminate information and communicate opinions on	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Participation in research projects and other activities carried out	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation.	P8S_KR

	scientific achievements to the society in a manner that is comprehensible to the general public, taking into account various points of view.	by research units.		
K04	Follows the principles of research work ethics, intellectual property rules and good professional practice; is aware of being part of a scientific community and is responsible for its development and importance for the promotion of a modern knowledge-based society.	1. Autonomous work, work with the doctoral dissertation supervisor, student's own research. 2. Participation in research projects and other activities carried out by research units.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation.	P8S_KR
K05	Conducts research with respect for the natural environment and without infringement of any humanitarian principles.	1. Autonomous work, work with the doctoral dissertation supervisor, student's own research. 2. Participation in research projects and other activities carried out by research units.	1. Assessment of the work and progress by the doctoral dissertation supervisor. 2. Documented active participation.	P8S_KO
K06	Complies with the principles of personal safety and other people's safety.	1. Autonomous work, work with the doctoral dissertation supervisor. 2. Participation in research projects and other activities carried out by research units.	1. Assessment of the work and progress by the doctoral dissertation supervisor.	P8S_KO

Explanation of codes used in Tables 1 and 2:

P8 – PQF Level – education at the Doctoral School, **S** – descriptors typical of the qualifications obtained in the higher education system

SD – learning outcomes at the Doctoral School

W – knowledge (descriptor): G – depth and scope, K – context

U – skills (descriptor): **W** – utilisation of knowledge, **K** – communication, **O** – work organisation, **U** – learning

K – social competences (descriptor): **K** – critical assessment, **O** – responsibility, **R** – professional role

01, 02, 03 – numbers of the learning outcome