## THE LEARNING OUTCOMES AND THE WAY IN WHICH THEY ARE VERIFIED FOR THE DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

### § 1

### Legal basis

Based on:
1) the Act of 20 July 2018, Law on Higher Education and Science (Journal of Laws of 2018, item 1668 as amended),
2) the Act of 3 July 2018, Provisions implementing Law on Higher Education and Science (Journal of Laws of 2018, item 1669, as amended),
3) the Act of 22 December 2015 on the Integrated Qualification System (Journal of Laws of 2018, item 2153),
4) the Act of 4 February 1994 on Copyright and Related Rights (Journal of Laws of 2018, item 1191),
5) Regulation of the Minister of Science and Higher Education of 14 November 2018 on the characteristics of the second level of learning outcomes for qualifications at levels 6-8 of the Polish Qualifications Framework (Journal of Laws of 2018, item 2218),
6) Regulation of the Minister of Science and Higher Education of 20 September 2018 on the fields of science and scientific disciplines and artistic disciplines (Journal of Laws of 2018, item 1818),

the learning outcomes are defined for educational curricula and individual research plans and the method of their verification at the Doctoral School of Wrocław University of Science and Technology in the following disciplines:

1) architecture and urban planning,
2) automation, electronics and electrical engineering,
3) technical informatics and telecommunications,
4) biomedical engineering,
5) chemical engineering,
6) civil engineering and transport,
7) mechanical engineering,
8) environmental engineering, mining and power engineering,
9) mathematics,
10) chemical sciences,
11) physical sciences,
12) management and quality science.

Education in these disciplines is provided in Polish; however, selected classes may be conducted in English. Parallel education in English or another modern foreign language may also be provided in selected disciplines within a fixed period of time.

### § 2

### Education at the Doctoral School prepares a doctoral student for the award of the doctoral degree

Education in a given discipline ends when a doctoral student submits a PhD dissertation and has obtained learning outcomes for level 8 of the Polish Qualifications Framework, included in the curriculum and individual research plan, verified in accordance with § 3, while learning outcomes in the area of modern foreign language skills are confirmed by a certificate or diploma of completion of studies certifying knowledge of that language at the language proficiency level of at least B2.

# § 3

## Learning outcomes and methods of evaluation

The tables entitled *Characteristics of qualifications – level 8*
- provide learning outcomes including knowledge, skills and social competences acquired by doctoral students after graduation from doctoral schools on the basis of universal first-degree characteristics for level 8 as defined in the Act of 22 December 2015. *o Integrated Qualification System* and second- degree characteristics for level 8, constituting a development of the universal first- degree characteristics defined in the Regulation of the Minister of Science and Higher Education of 26 September 2016 *on the characteristics of the second* degree *of the Polish Qualifications Framework typical for qualifications obtained within the framework of higher education after obtaining complete qualifications at level 4 – levels 6-8*, and
- specify how to verify the achievement of learning outcomes in relation to the educational process conducted according to individual educational plans, which include the completion of courses covered by the curriculum for the discipline concerned, the completion of commissioned internships, and the preparation and submission of a doctoral dissertation accompanied by a positive opinion of the promoter(s).

Successive semesters of education are credited on the basis of completed courses included in the curriculum and completed internships in accordance with the schedule of tasks specified in the individual research plan, which constitutes the verification of the assigned learning outcomes.

## CHARACTERISTICS OF QUALIFICATIONS - LEVEL 8

### KNOWLEDGE

| Descriptive categories – basic aspects | Code of the descriptive component | STUDENT KNOWS AND UNDERSTANDS: | METHOD OF EVALUATION: |
|---|---|---|---|
| **Universal** | **P8U_W** | - the world's scientific and creative heritage and its implications for practice | - student competently quotes other authors in articles published and prepared for publication in peer-reviewed scientific journals, peer-reviewed materials from international scientific conferences, and in book editions preceding the preparation of a doctoral dissertation<br>- undertakes activities aimed at obtaining patents on inventions, utility models and trademarks, registered industrial designs or topographies of integrated circuits is aware of the value of architectural, architectonic and urban works as well as works in the field of design and industrial design |

| Range and depth – completeness of cognitive perspectives and dependencies | P8S_WG | - to such an extent that it is possible to revise existing paradigms – world heritage, including theoretical foundations, general issues and selected specific issues – specific to a scientific or artistic discipline<br>- the main trends in the development of the scientific or artistic disciplines covered in the curricula<br>- research methodology<br>- the rules for the dissemination of scientific results, including in open access mode | - student has a sound knowledge of basic subjects such as mathematics, physics, chemistry or others<br>- has an advanced knowledge fundamental to a field relevant to his/her research, including the most advanced methods of research and verification of results achieved<br>- has advanced knowledge of directional subjects in a given discipline or in interdisciplinary subjects<br>- has knowledge at an advanced level of discipline and subject matter relevant to the field of research carried out, including the most recent research findings and scientific achievements |
|---|---|---|---|
| Context – conditions, implications | P8S_WK | - the fundamental dilemmas of modern civilization<br>- the economic, legal, ethical and other relevant conditions of scientific activity<br>- 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 | - student has a structured knowledge of humanities and/or managerial subjects<br>- has partial or complete preparation for university education<br>- understands the significance of copyright and unauthorised use of intellectual property of third parties in the preparation of a doctoral dissertation<br>- uses an anti-plagiarism procedure<br>- is prepared in terms of relations with the socio-economic environment with regard to the improvement of the curriculum and the possibility of applying the results of own scientific research<br>- is familiar with the principles and conditions of education at a doctoral school, including obtaining grants, scholarships and prizes<br>- is familiar with the rules and conditions for conducting proceedings for the award of the academic degree of *doktor* and distinctions<br>- |

## SKILLS

| Descriptive categories – basic aspects | Code of the descriptive component | STUDENT IS ABLE TO: | THE METHOD OF EVALUATION: |
|---|---|---|---|

| Universal | P8U_U | - analyse and creatively synthesise scientific and creative achievements in order to identify and solve research, innovation and creative problems; create new elements of this achievements<br>- independently plan his/her own development and inspire others to develop<br>- participate in the exchange of experience and ideas, including in the international environment | - is able to classify scientific publishers, including scientific journals, and scientific achievements according to accepted rules for:<br>- journals included in international databases Scopus and Web of Science<br>- impact factor (if),<br>- quoting,<br>- Hirsch index,<br>- i10-indicator<br>- have knowledge of current specification of active scientific journals in Scopus and Web of Science databases and their associated disciplines, as defined in the new classification of fields and disciplines |
|---|---|---|---|
| **Use of knowledge – solved problems and performed tasks** | **P8S_UW** | - use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular:<br>- define the purpose and subject of scientific research, formulate a research hypothesis,<br>- develop research methods, techniques and tools, and use them creatively,<br>- draw conclusions on the basis of scientific research,<br>- critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development<br>- transfer the results of scientific activities to the economic and social spheres | moreover<br>- student has scientific and technological skills relevant to methods and methodology of conducting scientific research and critical evaluation of the results obtained<br>- is able to create and conduct independent research, including outside the educational institution<br>- is able to creatively interpret the results obtained and to search for their application<br>- is prepared to intensify research with commercial potential |
| **Communication – reception and creation of statements, popularisation of knowledge in the scholarly environment and use of foreign language** | **P8S_UK** | - communicate on specialist topics to the extent that they enable an active participation in the international scientific community<br>- disseminate research results, including in popular forms<br>- initiate debates<br>- participate in a scientific discourse<br>- 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 | - is able to prepare and present an oral and multimedia presentation in English on the implementation of the research and to lead a discussion on the presented presentation.<br>- shows an active attitude in preparing a scientific publication in the form of a book or in the form of a scientific publication for printing in a peer-reviewed scientific journal listed in among scientific journals published by the Minister of Science and Higher Education, or in a peer-reviewed report on an international scientific conference or a public presentation of an artistic work |

| | | | - is able to prepare and make a public presentation of the results of research work, including a doctoral dissertation prepared under the supervision of a supervisor or supervisors, or an assistant supervisor and supervisor<br>- participates in innovative research and development projects |
|---|---|---|---|
| **Organisation of work – planning and teamwork** | **P8S_UO** | - plan and implement an individual or collective research or creative activity, including in an international environment | - student is able to establish and undertake scientific cooperation in research teams, including international research teams<br>- is able to link the implementation of the planned research with the mobility to domestic and foreign research centres<br>- is able to initiate and conduct discussions on research topics, results obtained and their interpretation<br>- is able to prepare and submit an application for a project, programme or competition announced by NAWA, NCBiR, NCN or an international competition for the implementation of a research project<br>- is able to apply for funding directly awarded for the development of young researchers, in particular: study grants, fellowships, traineeships, conference grants, from various sources of funding, including the European Union budget, or from any other grant awarding body |
| **Learning – planning od self-development and the development of others** | **P8S_UUU** | - independently plan and act for one's own development and inspire and organize the development of others<br>- plan classes or groups of classes and implement them using modern methods and tools | - student is able to lay down rules governing education at a doctoral school, conduct proceedings for the award of the academic degree of *doktor*, and be able to prepare the required documents<br>- is prepared to practise the profession of academic teacher in the field of research, teaching and organisational duties<br>- has didactic skills and professional qualifications related to the methodology and technique of teaching, including modern methods and techniques of teaching with the use of new technologies in the education of students<br>- is able to conduct didactic classes with students, conduct tests and colloquia, and assess the level of students' knowledge and the educational results achieved |

**SOCIAL COMPETENCES**

| Descriptive categories – basic aspects | Code of the descriptive component | STUDENT IS READY TO: | THE METHOD OF EVALUATION: |
|---|---|---|---|
| **Universal** | **P8U_K** | - an independent study to enhance existing scientific and creative output<br>- take up challenges in the professional and public sphere, taking into account:<br>  - their ethical dimension<br>  - accountability for their effects and the shaping of models of good practice in such situations | - student knows which activities lead to the creation of achievements in violation of law, including copyright, or good practices in science and what constitutes grounds for resuming proceedings for the conferment of the academic degree of *doktor* and *doktor habilitowany* or the title of *profesor* |
| **Assessments – critical approach** | **P8S_KKK** | - critical evaluation of the achievements of a given scientific or artistic discipline<br>- a critical assessment of their own contribution to the development of the scientific or artistic discipline in question<br>- recognising the importance of knowledge in solving cognitive and practical problems | - student is aware of the role of cooperation, including international cooperation, in the process of research and analysis of the results obtained<br>- understands and accepts the functions of the doctoral student care in the process of research planning, implementation and analysis of research results |
| **Responsibility - fulfilment of social commitments and acting for public interest** | **P8S_KO** | - fulfilling the social obligations of researchers and creators<br>- initiate public interest activities<br>- thinking and acting in an entrepreneurial way | - student understands the importance and significance of conducting research and teaching activities<br>- is aware of the need for doctoral students and young researchers to participate in collective decision-making bodies in matters concerning the organisation of the educational process at a doctoral school, as well as to have direct contact with their superiors<br>- has an acknowledged need to develop contacts between the scientific community and the socio-economic environment<br>- cooperates within the framework of scientific networks on methodological issues |
| **Professional role – independence and the development of ethos** | **P8S_KR** | - maintaining and developing the ethos of research and creative environments, including<br>  - carrying out scientific activities in an independent manner,<br>  - respecting the principle of public ownership of research results, taking into account the principles of intellectual property protection | - is aware of the social role of the scholar<br>- perceives the creativity of the pupil-master relationship, the creation of conditions for conducting research, and the legitimacy of the requirement of direct participation of academic teachers, including a promoter or promoters, or a promoter and a supporting promoter in the implementation of curricula and individual research plans<br>- sanctions the regulation of permitted public use and issues relating to the protection and allocation of intellectual property rights derived from research |