



## **FULL TEXT OF DIRECTIVE NO. 216**

elaborated on 5 May 2022

### **Quality Assurance of the Doctoral Degree Studies at the University of Žilina**

Discussed by: UNIZA Academic Senate on 25 April 2022

Approved by: UNIZA Scientific Board on 5 May 2022

Effective from: 5 May 2022

## **1. PART: INTRODUCTORY PROVISIONS**

### **Article 1**

1. This Directive Quality Assurance of Doctoral Studies at the University of Žilina is part of the internal quality assurance system of higher education at the University of Žilina (hereinafter referred to as "UNIZA") pursuant to Section 15 (1) (b) of Act No. 131/2002 Coll. on Higher Education and on Changes and Supplements to Some Acts, as amended (hereinafter referred to as "Higher Education Act") and pursuant Act No. 269/2018 Coll. on Quality Assurance in Higher Education (hereinafter referred to as "Quality Assurance of Higher Education Act") and is in accordance with the standards for the internal quality assurance system of higher education.
2. The mission of UNIZA is to develop education on grounds of scientific research activities in the spirit of national and democratic traditions, to foster harmonious personality, knowledge, wisdom, virtue, and creativity of each man and to contribute to the development of education, science, culture for the welfare of the whole society, also to contribute through its activities to the development of education, increase of scientific, technical and economic standards of society and the needs of practice, and thus to contribute to the development of a knowledge-based society. Through these activities, UNIZA responds to global developments in science, technology, and the needs of society. The policy in the field of quality assurance of higher education at UNIZA is based on the UNIZA Long-Term Plan. The level of educational and scientific research activities at UNIZA is regularly evaluated by means of a detailed report on the evaluation of educational and scientific research activities for a given academic year.
3. The doctoral study programme in the field of study focuses on the acquisition of knowledge based on the current state of scientific and artistic knowledge, and in particular on the student's own contribution to it, resulting from scientific research and independent creative activity in the field of science or technology or independent theoretical and creative activity in the field of art. Graduates of the doctoral study programme receive a third level university education.
4. Doctoral study is one of UNIZA's priorities. It has a special position in terms of education, science and research, creative artistic activity within doctoral fields of study and programmes. The quality requirements are set out in this internal regulation, which is closely linked to the internal quality system of UNIZA in accordance with the Higher Education Act and the Quality Assurance of Higher Education Act.
5. This directive is part of the internal quality assurance system of education at UNIZA and defines the qualitative requirements for the implementation of doctoral study programmes at UNIZA in terms of the institutional environment as well as the execution of doctoral studies. It defines the qualitative requirements for the guarantor of the study programme, the functioning of the field committee, the review panel, the supervisor and the specialist supervisor. In the field of doctoral study implementation, it defines the indicators of candidate evaluation and the quality of doctoral study, with emphasis on the internationalisation of study and the qualitative level of doctoral student outputs.

## **2. PART: QUALITY OF THE INSTITUTIONAL ENVIRONMENT**

### **Article 2 Education**

1. Education in the third level of higher education can only be provided in study programmes in individual fields of study for which UNIZA has obtained accreditation. Scientific research activity forms the basis for higher education also in the third level in each study programme. At UNIZA, there is a link and relationship between scientific research activities and the educational process ensuring the transfer of the latest scientific knowledge into higher education at all levels in accredited fields of study.
2. Education in doctoral study programmes is carried out under the guidance of a supervisor, following the individual study plan of the doctoral student. Education is based on the

acquisition of knowledge at the level of current knowledge and the doctoral student's own contribution to it. It results from scientific research and independent creative activity of the doctoral student. The quality in the third level of higher education is dependent on the quality of scientific research work. Therefore, it is essential that the individual study plans of doctoral students are linked to the scientific research activities of supervisors and educational workplaces, which are carried out mainly by means of solving research projects.

### **Article 3 Person Responsible for the Study Programme**

1. The person responsible for the study programme (hereinafter referred to as "study programme guarantor") is a university teacher holding the post of professor with the title of professor. With his/her expertise and personality, he/she guarantees the level, quality, and development of the study programme, coordinates the content preparation of the study programme, monitors the quality of its implementation under the conditions of UNIZA and evaluates the provision of the study programme. The guarantor is a recognised personality in the field he/she supervises, and the results of his/her creative activity have demonstrably reached at least a significant international level<sup>1</sup>.
  2. The study programme guarantor is employed at UNIZA for a set weekly working hours. In case of faculty study programmes, the study programme guarantor is accountable to the dean of the relevant faculty. In case of university-wide study programmes, the guarantor is accountable to the rector of UNIZA.
  3. The main responsibilities of the study programme guarantor are:
    - a) to guarantee the quality, level, and development of knowledge in the relevant study programme in accordance with the standards,
    - b) to expand his/her own creative activity by means of publishing scientific outputs in major journals and at international conferences,
    - c) to ensure and create suitable conditions for the implementation of the relevant study programme in cooperation with the head of the department where the study programme is being implemented,
    - d) to participate in the creation of conditions for professional, scientific, and academic growth of pedagogical and scientific-research employees who personally provide the study programme,
    - e) to ensure, in cooperation with the person responsible for the subject, that the content and nature of the individual subjects offered for the respective study programme are up-to-date,
    - f) to nominate new members to the field committee or review panel (working group) of the relevant study programme which is assigned to the field of study under his/her responsibility,
    - g) to nominate new supervisors in the relevant study programme which is assigned to the field of study under his/her responsibility,
    - h) to regularly inspect the level and quality of education, achieved outputs of doctoral students, dissertation examinations and dissertation theses in the study programme,
    - i) to supervise the level and quality of dissertation theses topics listed by the supervisors and their support by the projects in which the supervisors participate,
    - j) responsibility for the activities of the field committee or review panel if the guarantor is its chairman.
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<sup>1</sup>Standards for study programme of Slovak Accreditation Agency for Higher Education

#### **Article 4**

#### **Field Committee and Review Panel**

1. The procedure for establishing a field committee or review panel, the appointment of its members, status and activities of field committees or review panels in the process of preparation and implementation of studies and in the preparation and defense of dissertations in doctoral study programmes is regulated by Directive No. 110 Study Regulations for the Third Degree of Higher Education at the University of Žilina and UNIZA Methodological Guideline No. 7/2020 Operation of Field Committees of the Doctoral Degree Study at the University of Žilina, as amended on 15 October 2020.
2. Main responsibilities of field committee or review panel:
  - a) supervision of the implementation of study programmes falling within its scope of competence, guaranteeing the quality, development of knowledge and international level of the content of implemented study programmes, as well as the quality of supervisors,
  - b) ensuring that the education of doctoral students is carried out in accordance with the Directive No. 207 Code of Ethics of the University of Žilina,
  - c) ensuring the quality and international standard of dissertation topics proposed by supervisors,
  - d) approving the individual study plans of doctoral students, supervision of quality of their content, and giving approval to examinations in individual subjects,
  - e) proposing the composition of the committee and selection of opponents for the defense of the dissertation thesis.

#### **Article 5**

#### **Supervisor**

1. The position of supervisor for a given field of study at the faculty/university-wide workplace where the doctoral study is carried out may be performed by a university teacher (professor, associate professor) and, after faculty's Scientific Board/UNIZA Scientific Board (in the case of university-wide study programmes) approval, another expert from a workplace outside the university.
2. Supervisors authorised by the external educational institution may act as supervisors for topics of dissertation theses listed by this institution. The external educational institution shall provide the faculty's Scientific Board/in case of university-wide study programmes UNIZA Scientific Board with the scientific-pedagogical characteristics of these supervisors.
3. Supervisors for a given field of study at the faculty are appointed and dismissed by the dean of the faculty, at the university-wide workplace by the rector upon the approval of the faculty's Scientific Board/in the case of university-wide study programmes UNIZA Scientific Board.
4. The supervisor: guides the doctoral student during his/her doctoral study, in cooperation with the doctoral student draws up his/her individual study plan and submits it for approval to the field committee or review panel, directs and professionally guarantees the doctoral student's study and research programme and monitors the fulfilment of the scope of his/her teaching activities, determines the focus of the dissertation project and specifies its content together with the doctoral student, awards the doctoral student number of credits in accordance with the credit system of study, submits the annual evaluation of the doctoral student to the guarantor and the dean/in case of university-wide study programmes to the rector. As part of the annual evaluation, the supervisor submits to the guarantor and the dean/in the case of university-wide study programmes to the rector, a proposal for the exclusion of the doctoral student from doctoral study, a proposal to change the study programme in the field of study, statement on the doctoral student's request for interruption of studies, proposes to the guarantor and the dean/in the case of university-wide study programmes to the rector, the doctoral student's study stay in other domestic or foreign institutions of science, education, research, technology or art, prepares the dissertation review and the working characteristics of the assigned doctoral student, proposes to the guarantor and to the dean/in case of university-wide study programmes, to the rector, to appoint a supervisor-specialist to oversee

- specific parts of the doctoral student's scientific programme of study, arranges consultations with other experts when necessary, is a member of dissertation examination committee of the doctoral student and participates in the defense of his/her thesis without the right to vote.
5. The number of doctoral students (both full-time and part-time) guided by the same supervisor at the same time cannot be more than five. More doctoral students are permitted only if they are doctoral students finishing beyond the standard length of study.

### **3. PART: QUALITY OF DOCTORAL STUDIES**

#### **Article 6 Admission Procedure**

1. One of the main activities of the implementation of the doctoral study programme is the scientific research or artistic creative activity of the doctoral student, which forms an integral part of the doctoral studies. To verify these matters with the objective of ensuring a high standard of education and the pursuit of internationally acceptable results in science and research, the admissions procedure shall examine in particular:
  - a) the learning outcomes of the completed second degree of higher education,
  - b) the candidate's ability to work creatively when solving engineering tasks, e. g. by participating in solving projects of the UNIZA Grant System for students of the 2nd degree of higher education according to Directive No. 180 Grant System of the University of Žilina,
  - c) ability to make use of available scientific and expert resources, especially from international indexed databases,
  - d) ability to create publication outputs of the results of one's creative work and to publish them as papers in journals or proceedings,
  - e) ability to present the results of one's work by participating in conferences and competitions at home and abroad,
  - f) a reasonable level of proficiency in at least one foreign language.
2. It is expected and verified that the doctoral student is motivated for studies, possesses professional competence, prerequisites for creative and independent work, an active approach to the fulfilment of tasks and personal responsibility. These prerequisites are verified during a personal interview between the candidate and the members of the admission committee.

#### **Article 7 Individual Study Plan**

1. The doctoral student's study plan is formulated as an individual study plan, in accordance with ensuring the required quality of scientific work and education of doctoral students. The doctoral student's supervisor is responsible for the quality and level of both the study and the individual study plan, in the design of which the doctoral student actively participates. The individual study plan is approved by the field committee/review panel and the study programme guarantor.
2. The content and structure of doctoral students' individual study plans reflect the activities, knowledge and skills formulated in the accreditation dossier of the study programme. To ensure their fulfilment, the study plan defines requirements and criteria, the fulfilment of which is regularly monitored. The studies consist of study, educational and scientific part, whose content and mutual ratio in terms of credits are regulated by UNIZA internal regulations. The organisation of study of doctoral study programmes at UNIZA is governed by the provisions of Directive No. 110 Study Regulations for the Third Degree of the University Study at the University of Žilina.
3. As part of the evaluation of the third degree of university studies, credits are allocated to the doctoral student for specific activities. 180 credits are required for successful completion of the doctoral studies. These credits are obtained for the subjects of the dissertation

examination, foreign language, the dissertation examination, and the dissertation defense. In terms of scientific research activities, the doctoral student receives points for dissertation projects, publication outputs, patents, utility models, citations and active contributions at conferences and seminars, as listed in Annex 2.

4. In case of study programmes that award credits for individual and team research work, the points listed in Annex 2 shall be recalculated into credits in accordance with the study plans for the respective doctoral study programme.
5. Points or credits are awarded only for publications related to the dissertation topic and their number is recalculated according to the doctoral student's contribution percentage.
6. An integral part of the doctoral studies is a two-semester long study of a foreign language to acquire the professional foreign language terminology of the given field. Part of this is also the creation and writing of scientific papers and outputs in form of articles for journals and conferences in a foreign language, the preparation of presentations and active contributions at conferences.
7. Each individual study plan contains the subjects of the dissertation examination with a specified number of credits.

### **Article 8**

#### **Evaluation of the Quality of the Doctoral Student's Study and Outcomes**

1. Doctoral study is evaluated according to the principles of the credit system in accordance with the Decree of the Ministry of Education, Science, Research and Sport of the Slovak Republic No. 614/2002 Coll. on the Credit System of Study, as amended, Section 54 (2) of the Higher Education Act and the principles set out in this article.
2. The quality of PhD study is evaluated both during and at the end of the doctoral study. A successfully completed doctoral study is considered to be one in which all the required criteria have been met in addition to adherence to the timetable and where the doctoral student has published the results of his/her work in the form of the prescribed outputs, which are specified in the individual study plan.
3. During the implementation of the study programme, the evaluation is mainly concerned with the fulfilment of the content of the doctoral student's individual study plan. The evaluation is carried out annually at the end of the academic year by the supervisor and approved by the guarantor of the relevant study programme and subsequently by the dean/in case of university-wide study programmes the rector.
4. The decisive factors are the dissertation examination and the defense of the dissertation thesis. A doctoral student who has not fulfilled all the obligations resulting from the individual study plan and who has not obtained sufficient credits cannot apply for the dissertation examination or request permission to defend his/her dissertation thesis.
5. The quality of doctoral studies is evaluated by the faculty's Scientific Board or UNIZA Scientific Board annually as part of the evaluation of the public university level in educational activities and in the field of science, technology, or art.
6. Part of the doctoral study is a high-quality publishing and artistic activity of the doctoral student in cooperation with his/her supervisor. Successful completion of doctoral studies requires the fulfilment of the prescribed requirements in the field of the doctoral student's publication outputs in his/her individual study plan as well as the fulfilment of minimal criteria of doctoral study outputs in individual fields of study and programmes at UNIZA, which are necessary for the successful completion of doctoral studies and form Annex 1 of this Directive.
7. The quality of the doctoral student's outputs and their representation at conferences, seminars or journals is regularly evaluated by the supervisor as part of the annual evaluation. The results are then submitted to the guarantor, the dean, or the rector.
8. The quality of all publication outputs, patents, utility models or other achieved results is evaluated by the committee and the opponents during the dissertation defense. The emphasis is put at their international level and contribution to the development of the respective field of study and the originality of the achieved results, also in connection with the verification of the thesis' originality.

9. The quality of outputs, especially of graduating doctoral students, is continuously reviewed and the results regularly evaluated by the Rector's Advisory Board.

#### **4. PART: TRANSITIONAL AND FINAL PROVISIONS**

##### **Article 9 Transitional Provisions**

Doctoral study that started before the beginning of the academic year 2021/2022 is governed by the former regulations.

##### **Article 10 Final Provisions**

1. Any changes and additions to this internal regulation can be made only by numbered amendments, which are signed by the rector, after the consent of the UNIZA Academic Senate and approval of the UNIZA Scientific Board.
2. This Directive includes annexes:  
Annex No. 1 Minimal criteria of doctoral study outcomes in individual fields of study and programmes at UNIZA, which are necessary for successful completion of doctoral studies.  
Annex No. 2 Allocation of points for individual and team scientific work.
3. This Directive was discussed by UNIZA Academic Senate on 21 June 2021 and approved by UNIZA Scientific Board on 1 July 2021.
4. This Directive shall enter into force and effect on the date of its approval.
5. Amendment No. 1 to Directive No. 216 was discussed by UNIZA Academic Senate on 25 April 2022 and approved by UNIZA Scientific Board on 5 May 2022.
6. Amendment No. 1 shall enter into force and effect on the date of its approval by UNIZA Scientific Board, i. e. 5 May 2022.

In Žilina on 5 May 2022

prof. Ing. Jozef Jandačka, PhD  
Rector

**Minimal Criteria of Doctoral Study Outcomes in Individual Fields of Study and Programmes at UNIZA, which are Necessary for Successful Completion of Doctoral Studies**

These minimal criteria are a prerequisite for successful completion of the doctoral studies according to Directive 110, Article 7. Active participation of doctoral students in international conferences, especially those indexed in international databases (WoS, SCOPUS) and publishing in scientific journals.

The doctoral student's study plan also includes the obligation to publish the results obtained during the studies related to the topic of the dissertation thesis in at least one impacted journal that has been assigned a quartile of at least Q3 in Web of Science or at least Q2 in the SCOPUS database. The doctoral student has a 25% minimum share in the relevant publication. At the time of the dissertation defense, the doctoral student must submit a published article or a confirmation of its submission. Such article must have a valid quartile of at least Q3 in WoS or at least Q2 in SCOPUS.

As a rule, an integral part of doctoral student's activities in the full-time form of study, prescribed in the study plan, is an active participation in a foreign stay at a partner workplace of his/her educational workplace. Inclusion of a foreign stay of at least one month or one semester in the doctoral student's study plan is recommended.



| <b>Faculty</b>   | <b>Field of Study</b>    | <b>Study Programme</b>                              | <b>Framework Criteria</b>  |
|--|--------------------------|---|--|
| Faculty of Operation and Economics of Transport and Communications ( <i>in Slovak FPEDaS</i> ) | Transport                | Transport Technique and Technology                  | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Operation and Economics of Transport and Communications                             | Transport                | Postal Technologies                                 | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Operation and Economics of Transport and Communications                             | Transport                | Transport Services                                  | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Operation and Economics of Transport and Communications                             | Economics and Management | Economics of Transport, Communications and Services | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Operation and Economics of Transport and Communications                             | Economics and Management | Economics and Management of Enterprise              | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering ( <i>in Slovak SjF</i> )                                     | Mechanical Engineering   | Energy Machinery and Equipment                      | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Mechanical Engineering Technologies                 | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Automated Production Systems                        | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Technical Materials                                 | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Machine Parts and Mechanisms                        | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Computer Modelling and Machine Mechanics            | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Industrial Engineering                              | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Mechanical Engineering  | Mechanical Engineering   | Rail Vehicles                                       | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Electrical Engineering and Information Technology ( <i>in Slovak FEIT</i> )         | Cybernetics              | Process Control                                     | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |

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|--|--------------------------|---|--|
| Faculty of Electrical Engineering and Information Technology           | Informatics              | Telecommunications                                | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Electrical Engineering and Information Technology           | Electrical Engineering   | Heavy Current Electrical Engineering              | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Electrical Engineering and Information Technology           | Electrical Engineering   | Theory of Electrical Engineering                  | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Electrical Engineering and Information Technology           | Electrical Engineering   | Electrotechnologies and Materials                 | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Electrical Engineering and Information Technology           | Electrical Engineering   | Electrical Power Engineering                      | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Civil Engineering ( <i>in Slovak SvF</i> )                  | Construction Management  | Theory and Construction of Engineering Structures | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Civil Engineering   | Construction Management  | Theory and Construction of Building Structures    | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Civil Engineering   | Mechanical Engineering   | Applied Mechanics                                 | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Civil Engineering   | Construction Management  | Technology and Construction Management            | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Management Science and Informatics ( <i>in Slovak FRI</i> ) | Informatics              | Applied Informatics                               | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Management Science and Informatics                          | Informatics              | Intelligent Information Systems                   | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Management Science and Informatics                          | Economics and Management | Management  | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Security Engineering ( <i>in Slovak FBI</i> )               | Security Sciences        | Security Management                               | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Security Engineering  | Security Sciences        | Crisis Management                                 | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Faculty of Security Engineering  | Security Sciences        | Rescue Services                                   | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |

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|--|---------------------------------|-----------------------------------|--|
| Faculty of Humanities ( <i>in Slovak FHV</i> )                         | Media and Communication Studies | Mediamatics and Cultural Heritage | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |
| Institute of Forensic Research and Education ( <i>in Slovak UZVV</i> ) | Security Sciences               | Forensic Engineering              | at least 1 article in an impacted journal with a quartile of at least Q3 in WoS or at least Q2 in SCOPUS |

| <b>Allocation of Points for Individual and Team Scientific Work Evaluation of Individual and Team Scientific Work</b> |               |
|---|---------------|
| <b>Published Scientific Works</b>   | <b>Points</b> |
| article in an impacted journal that is in the Q1 quartile in WoS  | <b>80</b>     |
| article in an impacted journal that is in the Q2 quartile in WoS  | <b>60</b>     |
| article in an impacted journal that is in the Q3 quartile in WoS  | <b>40</b>     |
| article in an impacted journal that is in the Q4 quartile in WoS  | <b>20</b>     |
| Conference article and article in WoS proceedings   | <b>20</b>     |
| article in an impacted journal that is in the Q1 quartile in SCOPUS   | <b>40</b>     |
| article in an impacted journal that is in the Q2 quartile in SCOPUS   | <b>30</b>     |
| article in an impacted journal that is in the Q3 quartile in SCOPUS   | <b>20</b>     |
| article in an impacted journal that is in the Q4 quartile in SCOPUS   | <b>10</b>     |
| Conference article and article in SCOPUS proceedings  | <b>10</b>     |
| Other papers in journals or conferences in world (foreign) language/Slovak language                                   | <b>8/4</b>    |
| Protected outputs related to the dissertation thesis – patent   | <b>60</b>     |
| Protected outputs related to the dissertation thesis – utility model  | <b>30</b>     |
| Citation registered in the Science Citation Index   | <b>2</b>      |
| Active presentation of results at the conference in the world (foreign) language/in Slovak language                   | <b>10/5</b>   |