



# DOCTORAL SCHOOL DEVELOPMENT STRATEGY

Cracow University of Technology

## Abstract

Mission. Vision. Objectives in strategic areas: Education for and in collaboration with the socio-economic environment, Internationalization, Interdisciplinarity, and Social Responsibility

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## INTRODUCTION

The Strategy of the Doctoral School of Cracow University of Technology (CUT DS) is an extension of the overall CUT Strategy, thus it is closely aligned with its strategic provisions. The CUT DS Strategy elaborates and expands on key provisions related to the Doctoral School which influence its functioning, development, and the improvement of the quality of education for future doctors. The time frame for the CUT DS Strategy spans the years 2024–2028.

Doctoral Schools were established with the enactment of the Act of 20 July 2018 – Law on Higher Education and Science (Journal of Laws, item 1668). Doctoral Schools replaced the previous system of doctoral education within Doctoral Studies (third-cycle studies). The CUT Doctoral School was established by Regulation No. 27 of the Rector of CUT on the establishment of the Doctoral School dated 29 May 2019.

Financing for the CUT Doctoral School is provided under the provisions of the Act of 20 July 2018 – Law on Higher Education and Science, and executive regulations derived from that Act. The detailed scope and method of financing the CUT DS are defined in the Rules for financing the activities of Cracow University of Technology for a given year.

## MISSION

The mission of the Doctoral School of Cracow University of Technology is to educate future doctors in disciplines within the field of technical sciences, in which CUT has obtained a parametric evaluation higher than B+. The school creates conditions for doctoral students to acquire the necessary research and teaching competencies enabling them to contribute to social development and creation of an innovation-based economy.

*Mission – the Objective of the existence  
of the Doctoral School of Cracow  
University of Technology: benefits for its  
key stakeholders.*

The CUT DS maintains and strengthens the research and teaching potential of CUT by educating future academic teachers through fostering and developing innovative attitudes and competencies. This enables the university to conduct research collaboration with the socio-economic environment to address future civilizational challenges.

At the same time, the CUT DS educates professionals to meet the needs of entities within the university's socio-economic environment, enhancing the research and development potential of these entities to implement and develop innovative solutions in their operations and to improve their competitiveness.

## THE CUT DS GRADUATE PROFILE

The CUT DS Graduates:

- Are capable of conducting independent scientific research in at least one academic discipline.
- Are part of the scientific and managerial elite in the national and international labour market which significantly influences the setting of new development trends in various research areas and economic sectors and is capable of facing the most important civilizational challenges.
- Are outstanding specialists capable of learning and adapting quickly in emerging industries, possessing the most up-to-date theoretical and applicable knowledge, enabling them to solve specialized, complex problems.
- Have significant experience in collaborating with industrial partners on research and development projects.
- Possess future competencies – soft skills with a wide range of applications in a knowledge-based economy.
- Have intercultural competencies and experience in international cooperation.
- Are able to work in interdisciplinary teams.
- Are aware of the social, economic and environmental context of their activities and act in a socially responsible manner.
- Approach their future tasks with an innovative mindset.

## VISION

The CUT DS is an integral and key organizational unit of CUT, educating academic staff distinguished by research and teaching excellence. On the other hand, the education of doctoral students is a strategic element of the University's collaboration with other research institutions and entities in the socio-economic environment. The principles and education programme of the CUT DS take into account the University's strategy, including efforts related to the development of priority research areas.

The CUT DS effectively achieves its objectives in four strategic areas: 1) education for and in collaboration with the socio-economic environment, 2) internationalization, 3) interdisciplinarity, and 4) social responsibility.

Re. 1 The education programme, selection of teaching staff, and rules for verifying learning outcomes enable doctoral students to become familiar with the needs of stakeholders in the socio-economic environment regarding research collaboration and to conduct research in a way that addresses the most important socio-economic challenges.

Re. 2 The CUT DS is an internationalized institution to the extent that allows every doctoral student to participate in international collaboration with research institutions of a high scientific standard.

Re. 3 The CUT DS creates conditions for interdisciplinary collaboration for all doctoral students and teaches them the competencies necessary to engage in it.

Re. 4 The CUT DS offers courses that develop a sense of social responsibility among doctoral students. Every doctoral student has the opportunity to participate in such classes, related to their areas of research interest.

The CUT DS supports the development of proper relationships between a doctoral student and their supervisors and/or co-supervisors, recognizing the quality of this relationship to be of key significance in the educational process. Supervisors provide academic guidance to the doctoral student in their pursuit of achieving academic independence, as confirmed by the doctoral dissertation. The supervisor introduces the doctoral student to the academic and professional community, creating opportunities for them to initiate research collaboration.

*Vision – the image of the Doctoral School of Cracow University of Technology in the future: what is its characteristic, how it will be functioning.*

The CUT DS is a fair school. The School implements the University's Gender Equality Plan and Accessibility Policy. The CUT DS makes every effort to ensure that doctoral students do not experience discrimination based on gender, disability, origin, cultural background, etc. Based on the principle of impartiality and transparency, the CUT DS has established and effectively applies rules, regarding in particular recruitment, mid-term evaluation, awarding scholarships and other funding for research, changing supervisor(s), and resolving conflicts between doctoral students and supervisors.

An association of CUT doctoral students will operate under the auspices of the CUT DS, including both current doctoral students and graduates of the CUT Doctoral School and doctoral studies. The association will be supported by the CUT DS, particularly in facilitating connections between current doctoral students and CUT graduates employed in the entities within the University's socio-economic environment, who will serve as mentors for the younger members of the community.

The CUT Ds empowers its doctoral students. Doctoral students have their representatives in the most important decision-making bodies of the CUT Ds, and their opinions are taken into account when making decisions that are significant for the organization of the education process.

The CUT DS is a school that keeps on learning. It conducts regular analyses of its strengths and weaknesses, opportunities, and threats (the SWOT analysis). It monitors key socio-economic trends and challenges, as well as the situation in the regional, national, and international labour markets. As a result of these assessments, the Doctoral School makes appropriate adaptations: it improves its educational programmes, methods of verifying outcomes and procedures, it makes changes to the academic and teaching staff, establishes new collaborations, etc., in order to respond to the needs of future graduates and key stakeholders.

## STRATEGIC AREA I. EDUCATION FOR AND IN COLLABORATION WITH THE SOCIO-ECONOMIC ENVIRONMENT

The results of research conducted as part of the Economic Fates of Graduates project (Ekonomiczne Losy Absolwentów – ELA) show that the relative earnings index (normalized relative to the place of residence) of doctoral students completing their education at Cracow University of Technology is one of the lowest in comparison with other national universities offering education in the field of engineering and technical sciences. ELA reports indicate a relatively weaker alignment of the doctoral education programme at CUT with socio-economic needs.

Internal survey studies at Cracow University of Technology (conducted for the preparation of the Gender Equality Plan) also confirm the relatively weaker alignment, while indicating its likely causes. When surveying the opinions of doctoral students regarding various aspects of the university's operations, the following areas ranked among the three lowest-rated:

- doctoral students' access to courses conducted outside CUT,
- CUT doctoral students' access to internships in companies,
- doctoral students' access to courses led by professionals from industry and public administration.

Although, due to the transitional period in doctoral education (the replacement of doctoral studies with the doctoral school), the results of both studies cannot be considered fully adequate when it comes to doctoral studies, they do point to the strategic challenges facing the CUT DS: increasing the alignment of the education programme with the needs of stakeholders from the socio-economic environment and enhancing the competitiveness of doctoral school graduates in the job market.

### OBJECTIVE 1. INTEGRATION OF EDUCATION WITH THE UNIVERSITY'S PRIORITY RESEARCH AREAS

Addressing the identified challenges requires adopting a competitive strategy that involves leveraging strengths and opportunities to reinforce weaknesses and overcome threats. For the CUT Doctoral School, this means utilizing the research, educational, and relational potential of the university.

The CUT DS should primarily focus on educating doctoral students in the CUT's priority research areas. These include fields that meet the following joint criteria:

- high-quality of the related scientific activity undertaken at CUT
- relevance to the development of an innovative economy
- significance in addressing major societal challenges.

The CUT Doctoral School will update its education programme, regulations, and organization of the educational process, along with other key educational aspects, to adequately respond to the University's current and future priorities.

### OBJECTIVE 2. INCREASING THE INVOLVEMENT OF EXTERNAL STAKEHOLDERS IN THE DESIGN OF EDUCATION PROGRAMMES AND THE DEVELOPMENT OF PROCEDURES ESSENTIAL TO EDUCATION

In developing or updating the education programme, the CUT DS will collaborate more closely with the Councils of Employers in specific disciplines. Members of the Councils of Employers are appointed from among the institutions listed in the university's database of entities that closely cooperate with CUT.

The Councils of Employers perform an advisory role for the Council of the Doctoral School. The main tasks of the Councils of Employers include, in particular:

- presenting the demand from entities in the socio-economic environment for competencies important in research and research & development,

- reviewing educational programmes, including the adequacy of subjects and methods for verifying learning outcomes.

Additionally, the Councils of Employers will support the CUT DS in conducting the educational process, among other things, by facilitating contacts with individuals from the socio-economic environment interested in collaborating in the education of doctoral students as supervisors, co-supervisors, lecturers, and other roles important for education.

### OBJECTIVE 3. INCREASING THE USE OF WORK-INTEGRATED EDUCATIONAL TOOLS

The CUT DS will utilize good practices in teaching doctoral candidates, incorporating work-integrated learning (WIL) into education. This will enable doctoral candidates to apply their academic competencies while working with entities in the socio-economic environment and to utilize the competencies acquired through collaboration with this environment in their academic work.

It is also anticipated that the forms of education aligned with the WIL concept will develop doctoral candidates' transferable skills, that is competencies that they can apply across various career paths and industries, such as – for example – time management or critical thinking.

The CUT SD will strive in particular to increase the participation of:

- doctoral dissertations for which the academic supervision is provided by co-promoters employed in institutions from the socio-economic environment,
- individuals employed in institutions from the socio-economic environment in key educational processes, primarily in recruitment to the doctoral school and mid-term evaluations,
- individuals employed in institutions from the socio-economic environment in the education of doctoral students,
- innovative forms of education that integrate work, such as project-based learning and boot camps,
- practical methods of verifying learning outcomes,
- doctoral dissertations implemented under the "Implementation Doctorate" programme, in accordance with the directions and guidelines of the Minister responsible for higher education and science.

Additionally, the CUT SD will ensure that practical forms of classes (non-lecture-based) have a significant share in the modules of all scientific disciplines in which doctoral education is conducted.

### OBJECTIVE 4. DEVELOPMENT OF EDUCATIONAL PATHWAYS THAT RESPOND TO THE CAREER ASPIRATIONS OF DOCTORAL STUDENTS

According to ELA research, just under half of the graduates of doctoral schools were employed in any form (employment contract, civil law contract) by entities in the higher education and science sector for any period. The CUT DS will take into account the career aspirations and the demand for academic staff in the higher education and science sector based on ELA research or other relevant sources of information.

The Doctoral School will identify the needs of doctoral students planning to enter the workforce in the sector or beyond after completing their education and will develop separate educational pathways for each of these groups, particularly by adapting the organization of the education process and the programmes within the area of required professional internships and soft skills, motivational tools, and performance assessment.

For doctoral students planning to continue working in the higher education and science sector, the CUT DS will prepare a programme of activities to enhance teaching competencies and qualifications, including in areas such as the use of digital tools, teaching methodology, research skills, green transformation, or other significant areas



from the perspective of educational processes at every academic level. Participation in the program for doctoral students will be optional.

Despite the differences, both pathways will lead to the formation of academically independent graduates capable of conducting research at the highest level.

#### OBJECTIVE 5. INTEGRATION OF THE COMMUNITY OF DOCTORAL STUDENTS AND GRADUATES

The CUT DS will strive to integrate the community of current doctoral students with graduates of the CUT DS and CUT doctoral studies who, after completing their education, have taken up employment in institutions from the socio-economic environment that are important for the University and have achieved professional success there. In particular, the CUT DS will strive to establish an informal alumni association.

Similar to the Councils of Employers, the role of the Association will be to advise the CUT Doctoral School Council on aspects important for Work-Integrated Learning (WIL) and facilitate contacts with the socio-economic environment. However, the primary task of the Association will be to provide mentoring for current doctoral students of the CUT DS, especially for those planning to pursue employment outside the higher education and science sector after graduation

## STRATEGIC AREA II. INTERNATIONALIZATION

The level of internationalization of the CUT DS, measured by the proportion of foreign doctoral students, is lower than the national average for technical universities. The level of internationalization measured in this way corresponds to the level of internationalization of student education at CUT. These results suggest that the relatively low level of internationalization of the CUT DS in terms of the participation of foreign doctoral students is a consequence of the university's location in a highly competitive academic centre at the national level, which is Kraków.

In this situation, the strategic goals in the area of internationalization should not focus directly on increasing the recruitment of foreigners but rather on internationalizing various aspects of the educational process at the CUT DS, which will gradually lead to improving the quality of education and the School's recognition in the international community. Particularly important is the promotion of international cooperation, especially with countries where scientific development is at a high level — research has repeatedly demonstrated the connection between the level of international cooperation and scientific excellence.

### OBJECTIVE 1. STRONGER INTEGRATION OF DOCTORAL STUDENTS INTO INTERNATIONAL RESEARCH NETWORKS

Ultimately, every graduate of the CUT DS should participate in some form of international collaboration during their studies.

The CUT DS will undertake actions to involve its doctoral students in international cooperation, particularly with researchers from countries with highly developed higher education and research sectors, in order to enhance the impact of the scientific work conducted by the doctoral students.

The Doctoral School will introduce a scholarship programme for doctorates. As part of the exchange, doctoral students will participate in internships or other forms of education lasting from 1 to 6 months, during which they will carry out specific research tasks. The programme will have an outbound component — targeted at the CUT doctoral students — and an inbound component — aimed at doctoral students from foreign research centres who wish to complete an internship at CUT. Mobility scholarships will be awarded on a competitive basis. The CUT DS will seek to create a separate pool of funds for the programme from external sources, assuming co-financing from the foreign research institutions participating in the programme.

The CUT DS will establish a mobility fund for short-term (up to one month) trips for doctoral students to participate in prestigious conferences, summer and winter schools, courses, workshops, and study visits, or to conduct teaching activities. Additionally, the CUT DS will, in collaboration with foreign institutions, run *Blended Intensive Programmes (BIPs)*, which will include trips of several days combined with virtual (online) mobility.

The CUT DS will conduct workshops to prepare doctoral students for participation in international academic circulation, focusing especially on preparing publications in a foreign language and participating in international conferences. The CUT DS supports doctoral students in applying for mobility grants funded by the National Agency for Academic Exchange (NAWA) and international internship programmes such as Fulbright DAAD.

### OBJECTIVE 2. INCREASING THE INTERNATIONALIZATION LEVEL OF THE TEACHING STAFF

The CUT DS will take actions aimed at increasing the number of foreign visiting professors conducting classes for doctoral students.

The CUT DS will strive to increase the participation of foreign supervisors and co-supervisors in the scientific supervision of the development of doctoral theses.

The CUT DS will continue its efforts to increase the availability of classes in English.

### OBJECTIVE 3. DEVELOPMENT OF A JOINT INTERNATIONAL EDUCATION PROGRAMME

The CUT DS will aim to develop a new educational programme in international collaboration with one or more partner universities in areas covering priority research fields. The programme will prepare students for obtaining either a joint or double degree. The CUT DS will establish a team of experts from among the academic staff of CUT whose task will be to identify partners, as well as collaboration areas and model, prepare the programme's documentation, and finalize agreements (*memorandum of understanding*).

The CUT DS will specifically aim to establish this programme in collaboration with foreign institutions with which it is currently developing doctoral education projects (including institutions from the STARS EU university alliance) and institutions with which CUT faculties are jointly conducting student education programmes. The CUT DS, together with its consortium partners, will apply for funding for the educational programme from national sources (e.g. NAWA) or European funds (e.g. Marie Skłodowska-Curie Actions – MSCA).

Currently, the CUT DS is prepared to implement a doctoral education programme in the discipline of "Architecture and Urban Planning" in collaboration with FH Münster University of Applied Sciences (FH Münster).

### OBJECTIVE 4. BUILDING INTERNATIONAL RECOGNITION

The CUT DS will collaborate with the CUT International Relations Office and the Promotion Department to build its own brand and recognition by, for example, preparing informational materials aimed at prospective doctoral students from abroad, or participating in international webinars, meetings, as well as international educational fairs.

The CUT DS will leverage established partnerships to enhance the prestige and visibility of the doctoral school on the international stage. Academic exchanges or joint educational programmes should be accompanied by international events, such as symposiums and conferences.

The CUT DS will regularly organize summer schools with the participation of foreign doctoral students, led by renowned scientists from abroad. The summer schools will focus on topics related to priority research areas and, over the long term, will establish an international brand for the CUT DS as an institution specializing in training specialists in areas that are significant for society and the economy.

The CUT DS will support — also financially — the participation of doctoral students in important economic congresses organized both in Poland and abroad, such as Impact, the European Economic Congress, or the Economic Forum in Karpacz, which offer thematic paths for young researchers.

It is also important to support the participation of doctoral students in events specifically organized for them, such as the European Talent Fair, which is an accompanying event of ESOF—the largest conference in Europe focused on science culture, scientific research, and innovation.

### STRATEGIC AREA III. INTERDISCIPLINARITY

Conducting scientific research that addresses the needs of the socio-economic environment and responds to significant and complex civilizational challenges requires interdisciplinary collaboration among researchers and experts. Effective collaboration depends on two key factors: first, an excellent understanding of one's own field of knowledge (scientific discipline), and second, an understanding of the research perspectives of scientists from other areas of knowledge. To enhance the ability for interdisciplinary cooperation, the CUT DS will undertake actions that integrate doctoral students from various disciplines and foster interdisciplinary collaboration.

#### OBJECTIVE 1. DEVELOPING THE ABILITY OF DOCTORAL STUDENTS TO COLLABORATE IN INTERDISCIPLINARY TEAMS

The education programme will include participation of doctoral students in a regularly organized event that integrates the doctoral community of the entire CUT Ds and presents various theoretical and methodological perspectives. This event may take the form of an interdisciplinary conference, interdisciplinary seminar, etc. At least once during their studies, each doctoral student will be required to actively participate in such a conference (e.g. as a speaker).

#### OBJECTIVE 2. DEVELOPMENT OF DOCTORAL STUDENTS' INTERDISCIPLINARY EXPERTISE

The CUT DS will aim to increase the inclusion of courses in disciplinary modules that are designed to attract doctoral students from outside a particular scientific discipline and facilitate interdisciplinary collaboration. These courses may focus on case studies of successful interdisciplinary cooperation or involve forming interdisciplinary teams working together to solve a common research problem (*project-based learning*), etc. Each disciplinary module should include at least one optional course meeting these criteria. During their studies, it should be mandatory for doctoral students to complete at least one such course.

#### OBJECTIVE 3. DEVELOPMENT OF ACADEMIC GUIDANCE PROMOTING INTERDISCIPLINARITY

The development of a doctoral student's ability to collaborate in an interdisciplinary environment and their acquisition of a set of interdisciplinary skills are influenced by the interdisciplinary experience of their academic supervisor. The CUT DS will support the development of the capabilities of supervisors and co-supervisors in overseeing interdisciplinary doctoral dissertations.

The development of these capabilities will result from the rules for selecting supervisors. In cases where the doctoral student prepares a dissertation of an interdisciplinary nature or one oriented towards solving a social challenge, the academic supervision of the dissertation should be provided by a second supervisor or a co-supervisor from outside the leading discipline.

## STRATEGIC AREA IV. SOCIAL RESPONSIBILITY

A priority area of the CUT DS activities, deriving from its mission outlined in this Strategy, is the education of individuals who will participate in the development of the region and the country and, through their activities, respond to significant civilizational challenges. This mission includes, among others, educating doctoral students who are socially responsible. The CUT DS will support the development of 'social responsibility' of doctoral students, defined as awareness of the impact of one's own actions on various areas of social life and the environment, the ability to act in a way that the consequences of these actions conform to one's own ethical values, as well as the ability to collaborate with other stakeholders who influence these areas.

### OBJECTIVE 1. DEVELOPING SOCIAL RESPONSIBILITY OF DOCTORAL STUDENTS

The CUT DS will gradually incorporate classes aimed at developing social responsibility of doctoral students into the education programme. The objective of these classes will be to develop awareness of the ethical dilemmas that arise when science interacts with the public sphere, as well as the ability to analyze these dilemmas and choose appropriate forms of action. The classes should be closely related to the ethical problems encountered by researchers in specific disciplines and utilize case studies and tools from such areas of knowledge as applied ethics, sociology, and economics.

In the first step, the CUT Ds will prepare pilot classes for one of the disciplines to identify the format of classes that doctoral students would find most attractive. Ultimately, each doctoral student should be able to participate in social responsibility classes related to their leading scientific discipline, with these classes potentially having an interdisciplinary character. Participation in these classes will be voluntary.

## MONITORING PROGRESS

The CUT DS will implement its own monitoring system for tracking the achievement of objectives across all four strategic areas. Essentially, the internal assessment of progress will be an expert evaluation supported by a set of indicators. The system will include:

- key performance indicators (KPIs) to measure the degree of implementation of actions,
- key value measures (KVMs) to assess the quality and impact of actions on the doctoral students' learning outcomes.

Indicators of key value measures (KVM) must be seen as particularly important for assessing the development of doctoral education at the DS in the long perspective, including:

- For strategic area I, "Education for and in collaboration with the socio-economic environment": relative earnings and employability indicators from ELA reports, as well as measures of doctoral students' and graduates' satisfaction with their education and career (survey studies),
- For strategic area II, "Internationalization": the number and quality of publications issued by doctoral students in international collaboration, as well as measures of doctoral students' satisfaction with the tools promoting internationalization in their education,
- For strategic area III, "Interdisciplinarity": the number and quality of interdisciplinary publications issued by doctoral students, as well as measures of doctoral students' satisfaction with interdisciplinary support tools,
- For strategic area IV, "Social Responsibility": participation in social responsibility classes and the measure of doctoral students' satisfaction with these classes.

A set of indicators for the graduates of the CUT DS will be prepared in cooperation with the CUT Career Office.

## SUMMARY

The Doctoral School's strategy is subject to periodic reviews, done by the CUT DS Council at intervals no shorter than once a year, of the status and quality concerning the achievement of objectives set in each strategic area. In the event of significant time deviations in the achievement of specific objectives, an update of the strategy will be developed.

Monitoring the progress of key indicators is performed at least once every five years or upon the identification of previously unforeseen threats in the CUT DS strategy that may adversely affect the realization of the established strategic objectives.