Internal evaluation report of the new field of doctoral university studies

Chemistry

– Technical University of Cluj Napoca –

(IOSUD-UTCN)

2023

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

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MINISTERUL EDUCAȚIEI

UNIVERSITATEA TEHNICĂ DIN CLUJ-NAPOCA

UTCN Registration number ……/…… **ARACIS Registration number ……/……**

INTERNAL EVALUATION REPORT

Data presented to ARACIS Accreditation department by:

The Institution Organizing Doctoral Studies - Technical University of Cluj-Napoca (IOSUD-UTCN)

Doctoral School UTCN

Domain: Chemistry

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The data in the mentioned Report is complete, correct and in conformity with the principles of professional ethics.

CONTENTS

Introduction

The Technical University of Cluj-Napoca (UTCN) comprises twelve faculties operating in the two university centers, Cluj-Napoca and Baia Mare, as well as university extensions in Alba Iulia, Bistrita, Satu Mare and Zalău. This organizational structure gives the university a strong regional dimension, which personalizes it and differentiates it essentially from other universities in the country, the image of UTCN being, in fact, an image of technology, advanced scientific research, innovation and artistic creation in this region of Romania.

Today, more than 20,000 students study at UTCN, supervised by 910 teachers and researchers, together with 876 members of the teaching and non-teaching staff. The university's educational offer includes 91 undergraduate programmes, 92 master's programmes, 14 doctoral programmes as well as continuing education, psycho-pedagogical training and postgraduate academic studies.

The mission as stated in the UTCN Charter (HS 1326) and the development vision for the period 2020-2024 (HS 1253) steer the university firmly towards an approach that combines a focus on excellence with accountability by both members of the academic community and its leaders for their contribution to the institution's progress. Quality is considered by UTCN to be one of the priorities on which the university's strategy for the 2020-2024 period is structured.

Doctoral studies are the third cycle of university studies, and allow the acquisition of a level 8 qualification of EQF/CEC and of the National Qualifications Framework, obtaining the title of doctor, according to the Code of Doctoral Studies. The doctoral degree programmes organized within the UTCN Doctoral School are of the scientific doctorate type, the aim of which is to produce original scientific knowledge having international relevance. (HCA 120-12).

In the conceptual structure of the UTCN strategic plan there is a concern for increasing the quality of doctoral studies, followed by the assumption of the need to develop an appropriate management system. The areas and directions of intervention through measures that concretize this approach are the consolidation of excellence in scientific research and innovation, the strengthening and development of relations with the socio-economic environment, the expansion of international academic relations, the development and support of human resources, the modernization and development of the university infrastructure.

The internal evaluation report of UTCN Doctoral School 2023 includes in the first part (1) the institutional capacity of UTCN, the description of the field of doctoral studies in chemistry, and the internal quality assurance system. In the second part (2), the information necessary to assess the degree of fulfillment of the criteria, standards and performance indicators for the new field of doctoral studies in chemistry is presented, being structured in three main directions: institutional capacity (A), educational effectiveness (B) and quality management (C). The third part (3) contains strategies and procedures to be implemented at the level of the field of doctoral studies. Chapter III presents the evolution of the Organizing Institution of Doctoral Studies of the Technical University of Cluj-Napoca (IOSUD-UTCN) and the Doctoral School so far.

Finally, some strategies and procedures implemented for continuous quality improvement, beyond the existing minimum standards, are highlighted, and at the end of the report a SWOT analysis is included, as well as a centralized table of the fulfillment of the evaluation criteria and the annexes.

The total number of students admitted to doctoral studies has remained roughly constant over the last 5 years. In the research activity, income attracted and received from various competitions has increased significantly. A large number of projects have been won in international competitions, in prestigious partnerships, producing valuable scientific results. There is a significant increase in the number of citations, as well as in the number of citing articles, a positive development reflecting an increase in the prestige of

UTCN in the international scientific community. The quality of human resources has increased, with 77.7% of academic staff also being PhD supervisors. The evolution suggests institutional maturity, consolidation and stability in performance.

1. General information

1.1. Institutional capacity of IOSUD-UTCN

1.1.1 Short history of UTCN

The Technical University of Cluj-Napoca is the continuator of a rich tradition of technical education in the capital of Transylvania and represents, at the same time, a focal point for the future development of the region.

The achievement of the unitary Romanian national state on 1 December 1918 opened up new prospects for education at all levels. On 1 February 1920, the Higher Industrial School was founded, and the new school underwent a series of reorganizations before becoming the School of Technical Conductors in 1922. It was the only school of this level in the country, with an electromechanical profile, a forerunner of the Polytechnic of Cluj. Another school with a technical profile created in 1920 was the School of Public Works Conductors, with a focus on roads and bridges, a true precursor of the Faculty of Construction. The School of Technical Conductors, which enjoyed an important prestige within the Romanian industry, was reorganized in 1937 as the School of Electromechanical Sub-Engineers.

Following a memorandum addressed to the Ministry of Education concerning the establishment of a Polytechnic in Cluj with three faculties: Construction, Electromechanics, and Forestry, the provisions of the Education Reform Law of August 1948 created the Institute of Mechanics in Cluj, with a faculty of two sections: Thermotechnics and Machine Tools. The growing need for technical staff led to the Institute of Mechanics becoming the Polytechnic Institute of Cluj in 1953.

In 1992, the Polytechnic Institute changed its name to Technical University of Cluj-Napoca, and by restructuring, the three faculties came to be seven in number, and the Technical, Economic and Administration University College was also created. In 1998, the structure of the Technical University of Cluj-Napoca was integrated with the Faculty of Architecture and Urbanism, and in 2007 with the Faculty of Installations. In 2012, the Technical University of Cluj-Napoca merged with the Northern University of Baia Mare which became the Northern University Centre of Baia Mare. Currently, the Technical University of Cluj-Napoca trains specialists through bachelor, master, doctoral and postgraduate studies, with a student body of over 20,000. High-performance scientific research is a key concern of the teaching and research staff at UTCN.

The Technical University of Cluj-Napoca has been accepted, since 2003, as a member of the European University Association (EUA) and, since 2007, of the Francophone University Agency (AUF). UTCN is also a member of the Alliance of Universities for Democracy, Black Sea Universities Network, The Silk-Road Universities Network (SUN) and Danube Rectors' Conference (DRC). Since 2021, the Technical University of Cluj-Napoca has also been accepted as a member of the EUA Council for Doctoral Education (EUA-CDE). Since 2019 UTCN has been a member of the consortium of universities that founded the European University of Technology - EUt+. European universities are transnational alliances that will become the universities of the future, promoting European values and identity and revolutionizing the quality and competitiveness of European higher education. The EUt+ project runs from 2020 to 2023. The results achieved in teaching, research, university management and international cooperation have been appreciated by the Romanian Agency for Quality Assurance in Higher Education (ARACIS), which, following the evaluations of 2007, 2013, 2018, awarded UTCN the "High Degree of Confidence" rating: see Certificate Aracis.

The Technical University of Cluj-Napoca presents itself today as a modern higher education institution, being a "University of Advanced Research and Education", among the first twelve universities in the country, according to the Order of the Ministry of National Education no. 5262 of 5 September 2011

regarding the classification of accredited universities in the national education system. The University participated in the international QS Stars evaluation in 2019, and obtained 4 stars out of five possible, equivalent to an internationally recognized university of excellence, the certification being maintained in 2022.

In the QS ranking by EECA in the year 2022, our university is ranked 119th. In the main QS World University Rankings, UTCN is ranked 1,200+ for the year 2022, and for the year 2023 UTCN is ranked in the 1,201-1,400 range. In the QS ranking by specialization, for the year 2022, out of 1,543 ranked institutions, UTCN is ranked as follows: for Electrical and Electronic Engineering, it is ranked 351-400th worldwide and 2nd in Romania, for Computer Science it is ranked 601-650th worldwide and 4th in Romania, and for Mechanical Engineering it is ranked 301-350th worldwide and 1st in Romania. In the year 2022, UTCN appears in the QS ranking on the main field of Engineering and Technology on the 451-500th place, being in second place in Romania. In the 2021 Times ranking the Computing domain was ranked 800+ and the Engineering domain 800+ worldwide.

1.1.2. Short history of the Doctoral School

The launch of systematic scientific concerns and activity took place immediately after the establishment of the institution as a Polytechnic, in 1953, when Professor Alexandru Domșa was granted the right to lead the training of PhD students. The next supervisors of PhD students were Professors Bazil Popa, Ioan Lăzărescu, Alexandru Negoiță, Emeric Szekely. The concern of the Institute's management for the integration of young teachers in the system of doctoral studies, resulted in obtaining the right to supervise doctoral students in 5 specialties. At the same time, 4 teachers were sent to the USSR for their training. Continuous expansion of the system resulted in 20 scientific supervisors of doctoral students by 1978, providing training in the main technical fields. The result was very conclusive: between 1953 and 1973, 237 specialists were enrolled for doctoral studies, and in the last years of the period 67 doctoral students defended their doctoral theses. In 1978 the balance was considerably better: 81 doctoral degrees obtained in the Institute and 61 outside the Institute.

The first scientific title of doctor was awarded on October 22, 1960 to the engineer Sergiu Scadovscki following the thesis entitled: *"Contributions to the improvement of technological processes for the elaboration of malleable cast irons by balancing the graphitizing and anti-graphitizing action of some elements in the process of primary crystallization and the kinetics of isothermal transformations in the solid state"*, under the scientific supervision of Professor Alexandru Domșa. The next holders of the same scientific title were engineers Attila Palfalvi (1963) and Ioan Drăgan (1966) who later became renowned professors and rectors of the Technical University of Cluj-Napoca. Then, in 1966, the engineer Ioan Sonea defended his doctorate, mentioning that they all achieved the same performance under the scientific guidance of Professor Alexandru Domșa. He was also the scientific supervisor of the future rector and academician Horea Colan (1971).

In the year 1967, the first doctorate was awarded to Professor Bazil Popa (Engr. Virgil Focșa), in 1969 to Professor Alexandru Negoiță (Engr. Adrian C. Radu), in 1970 to Professor Ioan D. Lăzărescu (Engr. Eugen P.Pay), in 1971 to Professor Mircea Mihailescu (Engr. Eugen I. Beiu), in 1971 to Professor Vasile Ille (Engr. Ioan Teodor Păstrăv), in 1972 to Professors Igor Tertea (Eng. Traian I. Oneț) and Dezideriu Maroș (Engr. Mihai A. Bogdan), in 1975 to Professor Ioan Drăgan (Engr. George Vermeșan), in 1976 to Professor Andrei Ripianu (Engr. Ioan I. Crăciun), in 1978 to Professors Vasile Ionuț (Engr. Petru P. Brînzaș) and Emeric Szekely (Engr. Juliu I. Fejes), and the 100th PhD engineer was Francisc Lammert in 1980, under the supervision of Professor Ioan Drăgan.

Tab. 1 The first PhD supervisors of the Polytechnic Institute of Cluj-Napoca

Crt. no.	Name and surname	Specialty	Year of appointment
1	Prof.em.engr. Alexandru Domșa	Metal technology and metallography	1953
2	Prof.dr.doc.engr. Ion D. Lăzărescu	Tools and metal cutting	1963
3	Prof.dr.doc.engr. Alexandru Negoiță	Civil construction	1965
4	Prof.dr.doc.engr. Bazil Popa	Thermotechnics and thermal machines	1966
5	Prof.engr. Mircea Mihailescu	Reinforced concrete construction	1967
6	Prof.dr.engr. Ion Drăgan	Hot working	1969
7	Prof.dr.engr. Igor Tertea	Reinforced concrete	1969
8	Prof.dr.engr. Vasile Ille	Applied theory of elasticity and plasticity	1970
9	Prof.dr.doc.engr. Dezideriu Maros	Theory of mechanisms	1970
10	Prof.dr.doc.engr. Andrei Ripianu	Engineering mechanics	1970
11	Prof.dr.doc.engr. Emeric Szekely	Theory of mechanisms	1970
12	Prof.dr.engr. Andrei Albu	Machine tools	1973
13	Prof.dr.engr. Gheorghe Petriceanu	Machine Building Technology	1973
14	Prof.dr.engr. Horia Colan	Thermal treatments and the study of metals	1977
15	Prof.dr.engr. Vasile Ionuț	Technology of Agricultural Machine Building	1977
16	Prof.dr.engr. Virgil Moldovan	Metalworking machinery by plastic deformation	1977
17	Prof.dr.engr. Attila Palfalvi	Technology of metals	1977
18	Prof.dr.engr. Ferdinand Gobesz	Statics and dynamics of constructions	1977
19	Prof.dr.engr. Nicolae Juncan	Metal constructions	1977
20	Prof.dr.engr. Arpad Kelemen	Electric drives	1977

In the Report on the activity of the Senate of the Polytechnic Institute of Cluj-Napoca from June 1976 to April 1981, this situation is presented as follows: *Out of the total of 425 teaching staff, 102 are doctors in technical sciences, of which 4 have the scientific title of doctor of science, and 30 are doctors in mathematics, physics, economics, philosophy, philology. Only 72 staff are not registered for doctoral studies, mainly due to the fact that in recent years the entrance examinations have not been organized on time. The Institute has 20 scientific supervisors who supervise 202 doctoral students, 149 of whom belong to the Polytechnic Institute of Cluj-Napoca. Between 1976 and 1981, 69 teaching and research staff completed and defended their doctoral theses, 45 of whom belong to the Institute. A major shortcoming, pointed out in this regard, is the fact that at the Faculty of Electrical Engineering there is only one PhD supervisor, although there are many teachers who meet these conditions. On the other hand, the lack of scientific supervisors for all the technical fields and, of course, the need to improve the skills of specialists in fields other than the technical ones, meant that, in 1980, for example, a number of 60 teachers and researchers from the Institute were enrolled for doctoral studies at other university and academic institutions in the country. The 45 specialists who obtained their doctorate between 1976 and 1981 can be broken down as follows: 21 in the Institute, 20 at other institutions in the country and 4 abroad.*

The training and continuous improvement of teachers through doctoral studies was carried out between 1981-1984 as follows: 47 teachers and researchers completed and defended their doctoral thesis, 40 of them in the Institute. Thus, out of the 436 teachers at the Institute, 4 of them are docent doctors and 185 are doctors in science. However, there are 132 teachers who are not enrolled for doctoral studies, most of them young assistants and supervisors (lecturers), a situation which is due to the dangerously reduced number of places in doctoral admissions and the increasing time gap between colloquia.

The general situation in the country and in education worsened sharply from 1985 to 1989, when the problem of teachers became so embarrassing that in the highly politicized report, the Senate did not even consider it, but just sent it impersonally to the annexes. Here, doctoral training paints a suggestive picture of the dangerous compression and reduction of the system. *Thus, in 1989, 78 specialists were still enrolled for doctoral studies, of whom 35 were from the Institute (plus 15 from outside, and 28 from abroad), added to the 37 Institute staff enrolled for doctoral studies at other institutions in the country. Between 1985 and 1989, 32 staff members of the Institute defended their doctoral theses, obtaining the scientific title of Doctor of Science, of which 22 in the Institute and 10 in other institutions in the country. At the same time, 29 specialists from outside the Institute obtained their doctorate at the Institute. In 1989 the Institute had 202 PhDs and no docent PhDs were working at the Institute. The doctoral theses were defended by specialists enrolled in this form, following the admission colloquia of 1974-1980, because admissions had almost stopped in 1985-1989. As a result, the scientific supervisors, as many as there were, no longer had doctoral students enrolled, since most of them defended their theses, and some of them, lacking the necessary incentives - since the competitions for filling posts had also stopped - interrupted their training and were expelled.*

In terms of organizational structure, since the year 2005, doctoral studies at the Technical University of Cluj-Napoca are organized according to the Bologna system (third cycle of studies).

By University Senate Resolution no. 323 of 7 November 2014 (HS 323), 10 doctoral schools are established within UTCN: Automation and Computer Science, Electrical Engineering, Electronics, Telecommunications and Information Technology, Mechanical Engineering and Mechatronics, Industrial Engineering and Management, Materials and Environmental Engineering, Construction and Facilities, Architecture and Urban Planning, Applied Sciences and Humanities.

On December 5th, 2017, the UTCN Board of Directors decided to reorganize the 10 doctoral schools into a single Doctoral School, a decision approved by the University Senate by Resolution 856 of December 15th, 2017 (HS 856). The old Doctoral Schools are reorganized into Doctoral Programme Coordination Councils.

By Ministerial Order 5500/27.10.2021, published in Part I of the Official Gazette no. 1067/8.11.2021 (OM 5500), it was approved to maintain the accreditation for the organization of doctoral degree programs for UTCN as an Organizing Institution of Doctoral Studies (IOSUD-UTCN) and for the 14 fields of doctoral studies of the Doctoral School of UTC

The evolution of the number of PhDs of the Technical University of Cluj-Napoca from 1960 to present is shown in Fig. 1 and Fig. 2 respectively.

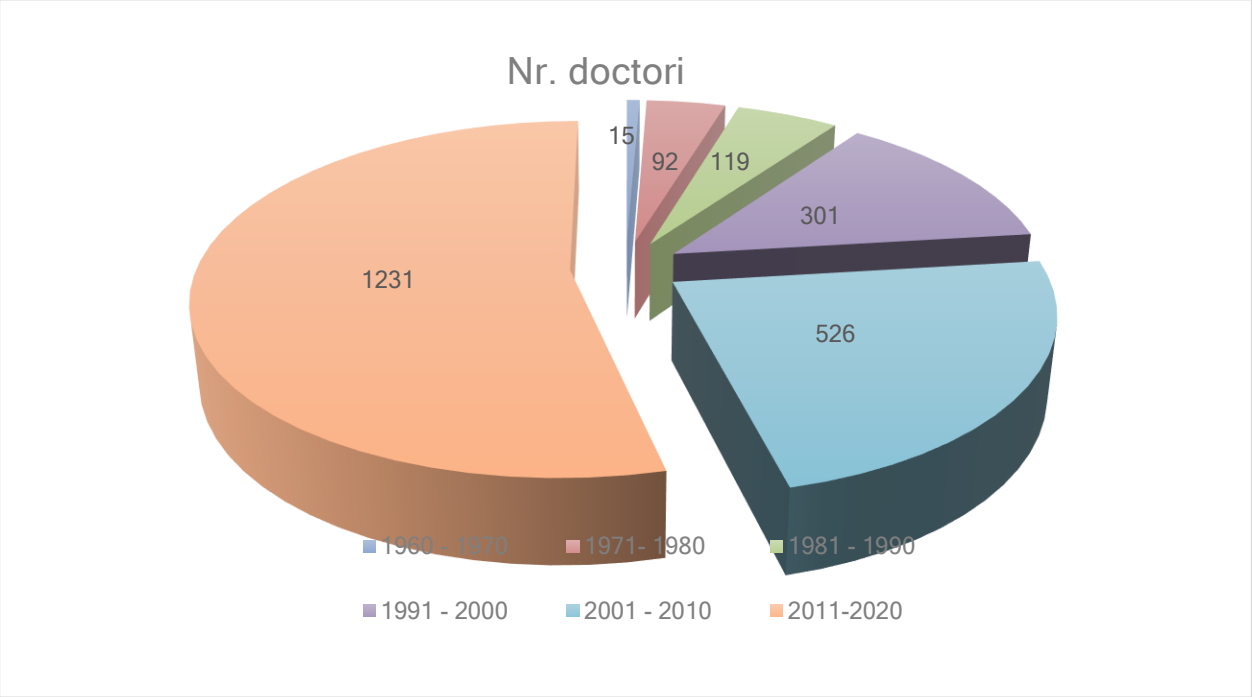


Fig. 1. Evolution of the number of doctors by decade

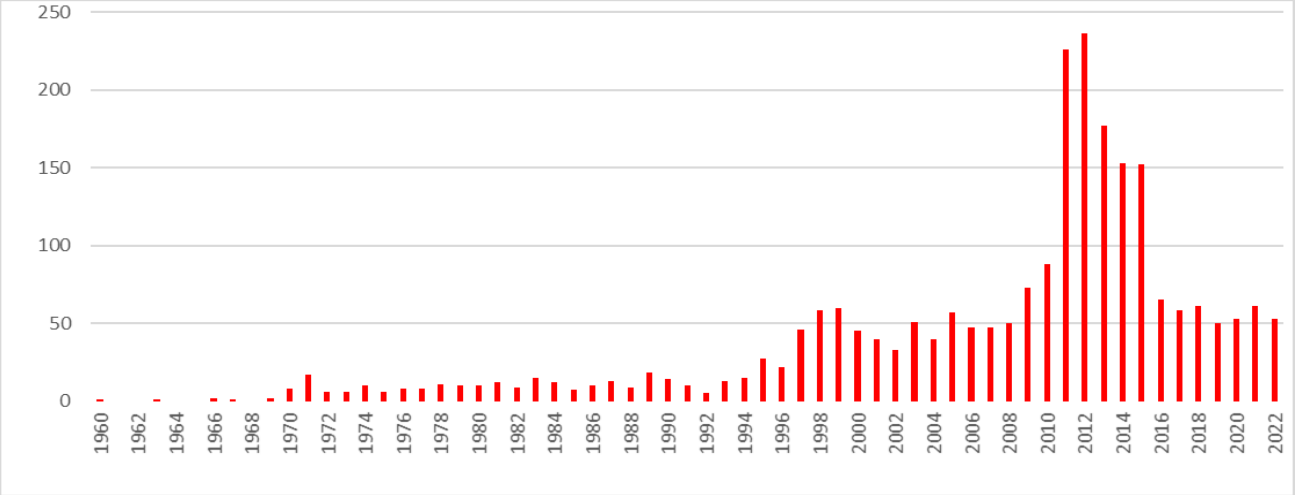


Fig. 2. Evolution of the number of doctors at Technical University of Cluj-Napoca in the period 1960-2022

It is noted that the number of PhDs between 2011-2015 is higher due to the multiple POSDRU programmes that the university has accessed during this period (PRODOC, SIDOC, QDOC, PARTING).
Annexes: HS 323 list of doctoral schools; HS 856 reorganisation of doctoral schools; OM 5500 maintenance of UTCN accreditation.

1.1.3. Organizational chart of IOSUD-UTCN

In accordance with the National Education Law with subsequent amendments and additions (see LEN 2011), the Code of Doctoral Studies with subsequent amendments and additions (see GD 681), and the Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca (see HS 1235), starting from 05.12.2017 IOSUD-UTCN was organized according to the organizational chart shown in Fig. 3.

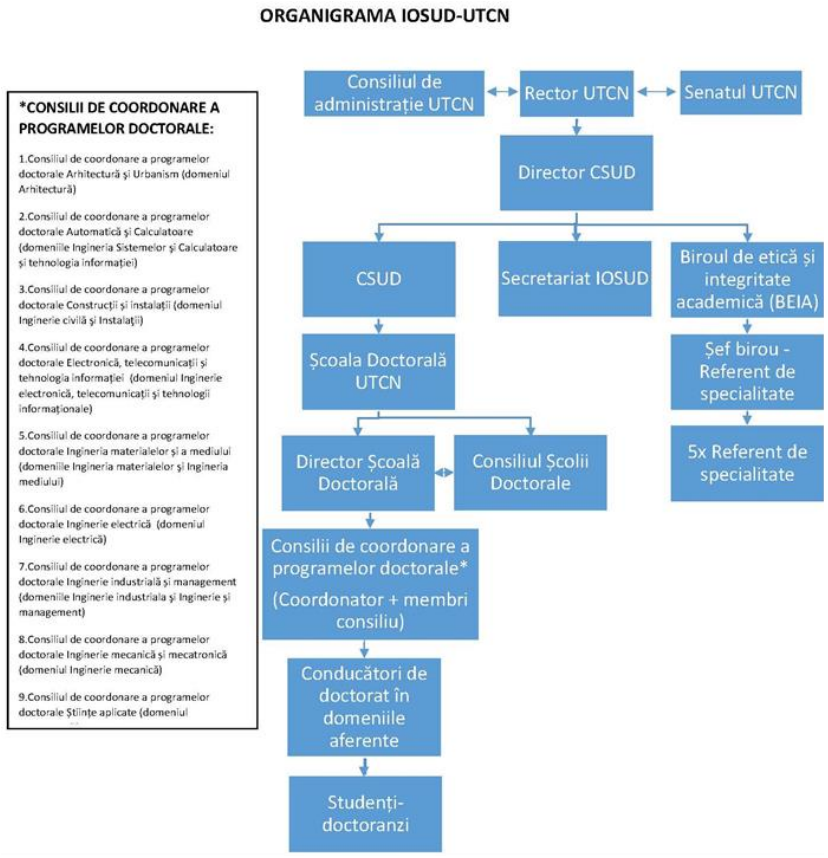


Fig. 3. IOSUD-UTCN organisation chart

The work in doctoral studies at the university is administered by the Council for Doctoral Studies (CSUD), which is headed by the Director of CSUD. The function of the Director of the CSUD is assimilated to that of Pro-Rector, in accordance with the legal provisions, and the person who occupies it is given the responsibility and authority of that function. The basic organizational unit in the IOSUD-UTCN is the Doctoral School.

Annexes: LEN 2011; HG 681; HS 1235; HS 1237.

1.1.4. Council for Doctoral Studies (CSUD)

The work of IOSUD-UTCN's doctoral studies is carried out by the Council for Doctoral Studies (CSUD), which is chaired by its Director, an ex-officio member of the CSUD. The CSUD currently consists of a maximum of 17 members, as follows:

÷ CSUD Director, appointed via competition;
÷ 1 member directly elected by universal, direct, secret and equal vote of the IOSUD-UTCN PhD supervisors;
÷ 3 PhD students representing different scientific profiles, elected by universal, direct, secret and equal vote of IOSUD-UTCN PhD students, one place each for the profiles: construction, mechanics and electrical;
÷ 12 members from IOSUD-UTCN or outside it, appointed by the Rector of UTCN (scientific personalities whose work has significant international recognition and/or personalities from relevant industrial and socio-economic sectors).

The main duties of the CSUD are:

÷ establishing the IOSUD-UTCN strategy;
÷ drafting and updating the IR;
÷ coordinating the IOSUD-UTCN doctoral school;

÷ approving decisions on the establishment and dissolution of doctoral schools in IOSUD-UTCN;
÷ selection of doctoral supervisors who are part of the doctoral school;
÷ coordination of partnerships established in accordance with the legal regulations referred to in Article 8(8). 1 of the Regulations for Doctoral Studies, according to the respective partnership contracts;
÷ endorsing the specific provisions of the doctoral school;
÷ initiating and approving projects for accessing national and European funds for doctoral and postdoctoral programmes and monitoring, together with the project directors, their implementation;
÷ other specific tasks, established by IR, according to the law.

The Director of the CSUD is appointed following a public competition organized by UTCN, based on the decision of the competition committee, approved by the University Senate. The Rector of the University concludes a management contract with the appointee for a period of 4 years.

1.1.5. IOSUD-UTCN Doctoral School

In UTCN, doctoral studies are carried out in the Doctoral School of the Technical University of Cluj-Napoca, which is constituted in accordance with the legal regulations in force.

The Doctoral School is a structure within IOSUD-UTCN made up of PhD supervisors (teachers/researchers) and PhD students, which is focused on scientific research and learning through research, and whose work is completed through PhD theses, scientific publications, innovations, patents and other results of scientific research. The scientific research activity in the doctoral school is integrated into the scientific research activity in the existing scientific research structures in UTCN.

In the UTCN Doctoral School, the PhD supervisors in the fields of Architecture, Computers and Information Technology, Civil and Plant Engineering, Electrical Engineering, Electronic Engineering, Telecommunications and Information Technology, Industrial Engineering, Engineering and Management, Materials Engineering, Mechanical Engineering, Environmental Engineering, Systems Engineering, Philology, Philosophy, Mathematics provide the necessary logistical support for the PhD programmes.

The Doctoral School is governed by the Director of the Doctoral School and the Doctoral School Council. The director of the doctoral school is assimilated to the director of the department. The Council of the Doctoral School is assimilated to the Council of the Department. The director of the doctoral school is appointed on the basis of the methodology for organizing elections and appointing the doctoral school leadership and approved by the University Senate. The structure and number of members of the Council of the Doctoral School of IOSUD-UTCN are established by the CSUD in accordance with the legal regulations in force. The Director of the Doctoral School is an ex-officio member of the Doctoral School Council.
The Council of the Doctoral School has the following tasks:

÷ draws up specific regulations for the doctoral school;
÷ proposes to grant or revoke the status of doctoral supervisor in the doctoral school;
÷ proposes minimum scientific performance standards for the affiliation of doctoral supervisors to the doctoral school and the affiliation procedure;
÷ proposes standards and approves the affiliation and termination of affiliation to the doctoral school of teaching or research staff who are not doctoral supervisors and who carry out teaching or research activities in that school, including as members of the mentoring committees;
÷ decides on the enrolment and expulsion of doctoral students, on the proposal of the doctoral supervisors who are members of the doctoral school;
÷ decides on the reassignment of the supervision of a doctorate in progress to another doctoral supervisor under the conditions laid down by law;
÷ mediates conflicts between doctoral students and supervisors;

÷ endorses the committees for the analysis and public defense of doctoral theses;
÷ prepares and proposes the content of doctoral degree programmes approved by the CSUD;
÷ establishes the intellectual property rights regime for the doctoral thesis;
÷ adopts the necessary measures to ensure the quality of doctoral studies, for the proper conduct of periodic evaluations of the doctoral school and doctoral supervisors, for compliance with the rules of ethics and deontology and for the external evaluation process for accreditation/reaccreditation or provisional authorization of the doctoral school;
÷ exercises other specific duties established by Law, Code, Charter, Institutional Regulations or other normative acts.

At the level of doctoral fields, doctoral studies are organized in Doctoral Programme Coordination Boards. They are subordinated to the UTCN Doctoral School and their establishment is approved on the proposal of the CSUD and the Doctoral School by the UTCN Board of Directors (BoD) and the UTCN Senate.

Doctoral Programme Coordination Boards are organized by doctoral fields at the level of the faculty/faculties supervising the respective doctoral fields. Doctoral research activity is integrated into the teaching and research activity of the faculty/faculties, with the consequence that the faculty/faculties assume responsibility, authority and allocation of the necessary resources.

In the UTCN Doctoral School, doctoral programs can be organized in collaboration, or separately within each faculty tutoring field. Each faculty takes responsibility for its contribution and reports on the related performance of PhD supervisors, PhD students and the resources it makes available to them.

The Doctoral Programmes Coordinating Board is led by a coordinator and members of the Council. The structure and number of members of the Coordinating Board is determined by the CSUD.

The duties of the coordinating councils are specified in the UTCN Doctoral School Regulations (HCA 68-5 - art. 8, par. 2).

The 10 coordinating boards of doctoral programs under the UTCN Doctoral School are:
÷ Coordinating Board of the Doctoral Programmes Architecture and Urbanism (Architecture field);
÷ Coordinating Board of the PhD programmes in Automation and Computer Science (domains: Systems Engineering and Computers and Information Technology);
÷ Coordinating Board of the Construction and Plant Engineering doctoral programmes (Civil and Plant Engineering field);
÷ Coordinating Board of the Electronics, Telecommunications and Information Technology doctoral programmes (Electronics Engineering, Telecommunications and Information Technology field);
÷ Coordinating Board of the Materials and Environmental Engineering doctoral programmes (Materials Engineering and Environmental Engineering fields);
÷ Coordinating Board of the Electrical Engineering doctoral programmes (Electrical Engineering field);
÷ Coordinating Board of the Industrial Engineering and Management doctoral programmes (Industrial Engineering and Engineering and Management fields);
÷ Coordinating Board of the Mechanical Engineering and Mechatronics doctoral programmes (Mechanical Engineering field);
÷ Coordinating Council of Doctoral Programmes Applied Sciences (Mathematics);
÷ Coordinating Council of the Humanities doctoral programmes (Philology and Philosophy fields).

Annex: Doctoral School Regulations: HCA 68-5.

1.1.6. Office of Academic Ethics and Integrity (BEIA)

Office of Academic Ethics and Integrity (BEIA) was established within IOSUD-UTCN by HS 1407 in accordance with the provisions of OM 5255 on the verification of ethics and academic deontology in the

preparation of doctoral theses between 1990 and 2016. The unit is subordinated to the CSUD and is responsible for the digitisation and verification of all doctoral theses, as well as the training of trainers in ethics and integrity, including the use of anti-plagiarism software.

In support of the activity of verification of doctoral theses in the period between 1990-2016, there was elaborated the Procedure for the verification of compliance with ethics and academic deontology in the elaboration of doctoral theses (period 1990-2016) within IOSUD - UTCN (HCA 131-26) and the Strategy for preventing and combating plagiarism in the Technical University of Cluj-Napoca (HCA 131-27). The process of scanning and digitisation of PhD theses was started in November 2021 and completed in 2022.

1.1.7 Ensuring the regulatory framework

In the period 2018-2022, IOSUD-UTCN has undertaken a series of actions to align doctoral studies in UTCN with the rigors and requirements of the legislation (LEN 2011) and the Code (HG 681). Among the measures implemented, special attention was paid to the compatibility of the regulations and methodologies of IOSUD-UTCN with the provisions of the National Education Law and the Code of Doctoral Studies. The list of normative acts developed in the period 2018-2022 is outlined centrally in the annex containing the Regulations, methodologies and decisions approved in IOSUD-UTCN in the reference period 2018-2022 (SD RMH).

The Institutional Regulation regarding the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca (HS 1235) constitutes the fundamental normative act for the organization and conduct of doctoral studies in IOSUD-UTCN. In addition to the provisions contained in the National Education Law (LEN 2011) and Doctoral Studies Code (HG 681), the regulation (HS 1235) stipulates a number of specific measures concerning the organization of IOSUD-UTCN, the Advanced University Studies-based Training Programme (UASTP) and research, doctoral programmes, etc.

Another important regulation is the Regulation of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN - approved by the CSUD and the Administrative Council on 23.01.2019. (HCA 68-5). It regulates the specific conditions of organization and conduct of doctoral studies at the level of UTCN Doctoral School, as well as the process of obtaining the habilitation certificate in IOSUD-UTCN. The habilitation process is detailed in the UTCN Regulation on obtaining the habilitation certificate and affiliation to a Doctoral School in IOSUD-UTCN, approved by the University Senate Resolution no. 1237 of 24.09.2020. (HS 1237). In addition to these regulations, a number of methodologies, procedures (among which HCA 164-19 lays down the procedure for habilitation) and Board resolutions to regulate various aspects of IOSUD-UTCN activity, including measures to promote professional ethics and deontology implemented at the level of the Doctoral School and the fields (SD RMH).

Regulations, methodologies, procedures and decisions in their entirety for the period 2018-2022 can be found on the IOSUD-UTCN website at: http://iosud.utcluj.ro/regulamente.html and http://iosud.utcluj.ro/hotarari-si-decizii-utcn.html.
Annexes: HS 1235; HS 1237; HCA 164-19; HS 856; HCA68-5; HCA131-26; HCA 131-27; SD RMH.

1.1.8 The mission and vision of IOSUD-UTCN/UTCN Doctoral School

The Charter of the Technical University of Cluj-Napoca (HS 1326) states as its mission: *developing value in people, processes and products, aiming in this sense to achieve a high quality level of advanced scientific education and research in specific fields, in a national and international context, responding to the needs of intellectual, professional and social development of the individual and the progress of Romanian society.* The university's mission is a synthetic expression of the framework within which the university

intends to assume its role as a generator and disseminator of knowledge in the local, regional, national and international communities. Within this framework, our institution understands that, in a knowledge-based society, the university becomes a driver of economic growth in the community and an agent of well-being for every individual who benefits from its services.

The mission assumed by the IOSUD-UTCN academic community is to provide the necessary environment for doctoral studies, to enable the development of knowledge in the doctoral fields offered by IOSUD-UTCN and to provide it to the socio-economic environment, transferring research and innovation through specific services all aimed at generating added value by contributing to economic growth and welfare of the individual and society.

The vision of UTCN steers it firmly towards an approach that combines a concern for excellence with accountability by both members of the academic community and its leaders for their contribution to the institution's progress. It suggests process-level maturation, consolidation and stability in performance.

The components of this vision are those on which the institution's development approaches will be based and in which the answers to the challenges that will arise during this period will be sought. These are:

÷ academic excellence rewarded by national and international recognition;
÷ contribution to the social and economic well-being of the region;
÷ entrepreneurial behavior matched by responsibility in managing resources;
÷ a university community that is strong in the values it promotes, motivated to perform and accountable for its own performance.
÷ institutional environment which combines attractiveness and accountability for the university's students and ensures equal access to opportunities.

The IOSUD-UTCN vision proposed for the 2024 time frame is that of an Institution built around the following major ideas:

÷ education linked to the needs of the socio-economic environment;
÷ interdisciplinary research linked to Horizon 2024 strategies;
÷ internationalization and progress-oriented institutional development.

The core values underpinning the proposed vision and mission are: professionalism, transparent decision-making, high quality, individual and collective accountability, equal opportunities and academic freedom, values that must be defining for the entire academic community of the UTCN Doctoral School.

These values are built around guiding principles: integrity, objectivity, consistency, perseverance, openness to PhD students and supervisors, the demands of the socio-economic environment, promotion of values and encouragement of open opinion. We must realize that we are a strong community, which can become valuable only through communication and teamwork, managing to make the Technical University of Cluj-Napoca a successful model of Romanian higher education.

The symbiosis between research and education, carried out within a viable institutional framework, is the key to progress, in which research must be the result of passion, stubbornness, non-acceptance of failure and continuous evolution and education an integration of us, as trainers of new generations in a process of continuous education adhering to the new challenges imposed by society.

Annex: HS 1326.

1.1.9 The strategy of IOSUD-UTCN and UTCN Doctoral School regarding quality assurance

The IOSUD-UTCN and UTCN Doctoral School quality assurance strategy is an integral part of the overall strategy of the Technical University of Cluj-Napoca, with the following mission dimensions (cf. UTCN Strategic Plan 2020-2024, see HS 1253):

- reshaping and adapting the offer of education, scientific research, innovation and artistic creation to the needs and expectations of society;
- cultivating the values, skills and capabilities needed for full integration into the European area of excellence in education, artistic creation, research and innovation;
- digitisation of educational and administrative processes in order to increase institutional quality and performance;
- increasing the international dimension to ensure access to world-class universities according to QS STARS RATING SYSTEM criteria or other relevant rankings

The mission of IOSUD-UTCN (p. 3 in HS 1253) is to ensure the institutional framework necessary to link human resources, infrastructure and performance-oriented institutional culture in order to build advanced research skills usable by the socio-economic environment and to deliver concrete results in the field of scientific, humanistic and artistic production, which are recognised nationally and internationally.

The vision of IOSUD-UTCN (p. 3 in HS 1253) is to contribute to strengthening the role of doctoral research as a fundamental component of the university based on advanced research, which facilitates the process of transforming young graduates into promising researchers by implementing the concept of "learning by doing" under the guidance of experienced and recognised supervisors.

The quality assurance strategy is based on a combination of the management principles promoted by the ISO 9001 family of standards and the guidance contained in the methodological guidelines developed by ARACIS on the quality of doctoral studies:

÷ **Focus on beneficiaries:** IOSUD-UTCN pilots and monitors the implementation of doctoral degree programmes with the aim of creating added value in the socio-economic environment, through trained specialists (doctoral graduates) who become contributors to regional, national or international development, as well as through research results (publications, products, technologies, etc.) that contribute to specific benefits in the public or private sector.

÷ **Legal and regulatory framework:** Monitoring and applying the legal provisions in place without exception, ARACIS regulations and good practices in research, development and innovation management without exception contribute to the legality, predictability and accountability of doctoral studies.

÷ **Leadership and initiative:** IOSUD-UTCN encourages the proposal and undertaking of development projects that contribute to increasing the quality of doctoral studies and research and innovation results. Doctoral students and supervisors benefit from the academic and administrative support of the UTCN Doctoral School and are supported in proposing and carrying out research and development topics of products, technologies or artistic and humanistic contributions.

÷ **Orientation towards processes:** UTCN's quality management system is designed in accordance with specific ISO 9001 process orientation. Documented regulations within the institution contribute to the control, monitoring, analysis and improvement of processes critical to quality.

÷ **Staff involvement:** All UTCN staff involved in doctoral studies, in the scientific, strategic and administrative dimensions, are trained, supported and motivated to contribute to the quality of the doctoral approach through competence, proactive and problem-solving attitude and awareness of the role of this type of studies in the long-term strategy of the university.

÷ **Ensuring human and material resources:** Doctoral studies are supported centrally through the adequate allocation of human resources (PhD supervisors, doctoral school staff) and materials (infrastructure, utilities) and through access to centralized university services (dormitories, canteens, sports facilities, etc.). The activity of doctoral supervisors is also supported in attracting resources specific to their research topics through the submission of investment or research projects necessary for the successful completion of the doctoral degree programmes.

- **Continuous improvement:** IOSUD-UTCN considers continuous improvement a top priority and is committed to implementing this concept by increasing scientific complexity and applicability in the socio-economic environment, digitization and administrative simplification and supporting the long-term investment plans of the Technical University of Cluj-Napoca.
- **Visibility and internationalization:** One of the main goals pursued through the doctoral programs is to increase the compatibility and connectivity of the research conducted at the Technical University of Cluj-Napoca with the international research environment. To this end, mobility and academic doctoral exchange programmes, cotutelle doctoral research, participation in prestigious international scientific events and publication of scientific articles in internationally renowned journals, as well as European patenting activities and transnational knowledge and technology transfer are encouraged.
- **Transparency, traceability and effectiveness:** Doctoral studies at IOSUD-UTCN are based on the principles of responsibility towards society and respect for academic ethics. Accordingly, classical and digital mechanisms are implemented at the level of the Doctoral School to comply with university ethics, to stimulate creativity, to ensure originality and dissemination to all stakeholders.

The mission and vision set by the Technical University at the general level are implemented at the level of the UTCN Doctoral School and the 14 fields of doctoral studies. The basic mission of the IOSUD-UTCN Doctoral School is to organize and develop doctoral education and in-depth scientific research activity in accredited doctoral fields at national and international standards of excellence, in the context of interaction with the economic, social and academic environment at local, national and international level. Each field may set additional specific objectives according to its specificities.

The educational management of doctoral studies promoted by the UTCN Doctoral School has the main purpose of analyzing, coordinating and supervising the effectiveness of the educational processes taking place at the university in order to ensure a general normative framework and its implementation at all levels concerned. At the basis of the quality assurance process of doctoral studies is the evaluation of the educational offer according to the two types of competences, focused on learning through research established in accordance with the principles underlying the European Qualifications Framework and the National Qualifications Framework for Higher Education in Romania.

Annex: HS 1253.

1.1.10 Operating the internal quality assurance system

The architecture of the quality assurance system for doctoral studies involves the following key stakeholders and areas of competence:

- **Council for Doctoral Studies,** responsible for strategic and decision-making processes in accordance with IOSUD-UTCN strategic plans;
- **UTCN Doctoral School**, responsible for the management and administrative processes required for the initiation, conduct and successful completion of doctoral studies;
- **Doctoral supervisors**, responsible for the core processes of doctoral student mentoring and doctoral scientific research, including good research practices, research methodologies, dissemination of results and academic ethics;
- **PhD students**, responsible for the fulfillment of contractual obligations and for the implementation of the Advanced Degree Based Training Programme (PPUA) and the Individual Scientific Research Programme PCS, with the aim of transferring skills and research results to the socio-economic environment;
- **Related structures within UTCN** (Prorectorate for Scientific Research and IT Infrastructure, Prorectorate for International Relations, Directorate for Management of Research, Development and Innovation (DMCDI), International Relations Office (BRI), Faculties, Doctoral Programme Coordination Councils, Administrative

Services, etc.), responsible for the support processes necessary to carry out the work of doctoral students in good academic, logistical and social conditions.

For each of these parties, a framework for operation and performance is defined in accordance with the legislation and regulations in force and the IOSUD-UTCN quality assurance strategy. The primary regulations, which refer to direct activities carried out by IOSUD and the Doctoral School, are permanently available to doctoral students and the interested public on the IOSUD-UTCN website (http://iosud.utcluj.ro), and the direct regulations that refer to the activity within each doctoral contract are established/agreed by each individual doctoral supervisor.

Administrative and support functions dedicated to PhD students are available through the specialized structures of the Technical University of Cluj-Napoca. The Doctoral School has a specialized Secretariat that facilitates the development of doctoral study programs for both doctoral students and supervisors.

The main mechanisms implemented for ensuring, evaluating and improving the quality of doctoral studies at IOSUD-UTCN are mentioned below:

- **Internal and external evaluation:** Quality assurance, control and improvement of doctoral studies is achieved through the implementation of internal and external evaluation activities on the scientific, strategic and administrative dimensions. The internal evaluation of the scientific work is done annually with the SIMAC system used for evaluation by all academic staff. PhD supervisors and PhD students have accounts in this system and the reported results are audited internally through the DMCDI. External scientific evaluation is carried out on project proposals and publications by the bodies responsible for these competitions or events. From a strategic and administrative point of view, the work of the Doctoral School as well as decision-making needs are discussed in the CSUD, the Board of Governors (BCA), the Board of Directors (BoD) and the University Senate. Externally, these areas are subject to evaluation as required by law, namely through public reports by the CSUD Director and the new Doctoral School accreditation process. The research activities carried out through the doctoral programmes and the related managerial activities are also subject to internal or external audit missions (Court of Auditors, Ministry of National Education).
- **Corrective and preventive actions:** The communication, analysis and decision-making processes necessary for a comprehensive three-phase improvement mechanism are implemented at the level of IOSUD-UTCN: corrections introduced in time to reduce or eliminate the effects of problems, corrective actions taken on the basis of a detailed analysis to eliminate the causes of deficiencies reported internally (PhD supervisors, PhD students) or externally (CNATDCU) as well as preventive actions and systemic improvements included in strategic plans at institutional or PhD school level aimed at increasing the quality of PhD studies in the long term.
- **Risk management:** Regular meetings are held within the CSUD and the doctoral fields to discuss the main risks identified by the doctoral supervisors and doctoral students with regard to the smooth running of their studies. Scientific, legal, economic and social issues are considered, including the functioning of the research infrastructure and the provision of adequate study conditions, for which appropriate mitigation or elimination measures are proposed.
- **Benchmarking:** This mechanism of benchmarking with similar actors in the country or abroad is implemented both at the level of IOSUD-UTCN through the input of CSUD members, and at the level of doctoral study areas. Both the scientific and the management components of doctoral studies are targeted, and best practices and successful solutions in the field are analyzed for their suitability to the situation in UTCN. Regular meetings and discussions with peers (Doctoral School management, PhD supervisors, PhD students) take place which contribute to the development of mechanisms to boost excellence.

- **Continuous education:** Doctoral studies are a basic element of the strategy of the Technical University of Cluj-Napoca regarding the training of high-level specialists capable and interested in continuing their professional development during their career. The role of researchers in both the public and private sectors is to contribute to the advancement of knowledge and its transformation into products and technologies useful to society, and the foundations of this mental and behavioral construction are laid during doctoral studies through the development of creativity, discipline and meticulousness, as well as research skills in doctoral students.
- **The role of peer reviews:** The success in research is strictly linked to critical thinking and the ability to continuously improve the work already done. This mechanism is implemented within the doctoral study areas of the IOSUD-UTCN through the widespread conduct of peer review activities within the research collectives, in the support of research reports and feedback mechanisms from the mentoring committee, continuous monitoring by PhD supervisors, performance-oriented strategic approaches at the level of the Doctoral School, as well as externally through the evaluation of project proposals and publications by specialists from home and abroad.
- **The PDCA (Plan-Do-Check-Act) cycle:** The quality assurance function within IOSUD-UTCN is structured on the four fundamental steps of the PDCA (Plan-Do-Check-Act) improvement cycle. Approaches, actions and projects are discussed in a broad and transparent framework, implemented with the help of the university's human and material resources, and then the results are measured and critically analyzed to determine necessary corrections and opportunities for improvement. These steps are carried out at all relevant levels, from the doctoral training programme of each doctoral student, to the level of the research teams, to that of the doctoral fields and finally to the IOSUD level.

1.1.11. Evolution of the doctoral school to date

1.1.11.1 Teaching activity

Admission to doctoral studies

In IOSUD-UTCN admission to doctoral studies takes place in the UTCN Doctoral School in accordance with the Regulations for admission to doctoral studies in the Technical University of Cluj-Napoca approved by the UTCN Senate and within the limit of doctoral grants allocated by the Ministry of Education to the Technical University of Cluj-Napoca. (see HS 1467). The distribution of grants to doctoral fields takes into account the performance criteria of the doctoral school supervisors.

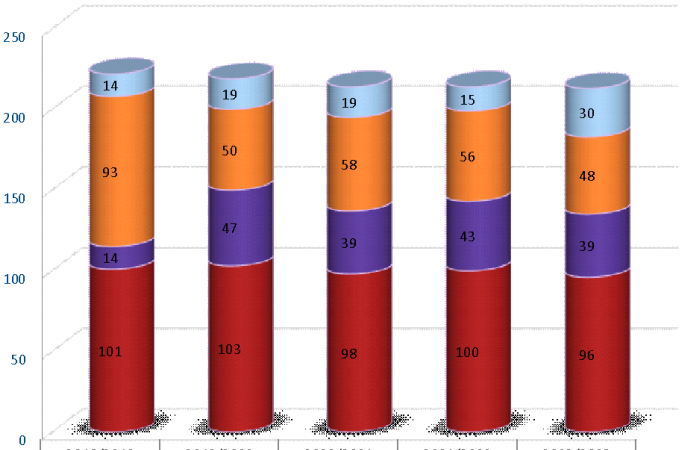
Regardless of the field, the PhD admissions competition consists of at least two tests:

÷ an interview in which the candidate's level of training and scientific/professional interests, research skills and the proposed topic for the PhD thesis are analyzed;

÷ a language proficiency exam for an international language taken in the UTCN Department of Modern Languages and Communication.

In order to ensure a transparent application and selection process for PhD students, all admission information is posted on the IOSUD-UTCN website (http://iosud.utcluj.ro/admitere.html). The timetable for admission is also provided (HCA 165-16).

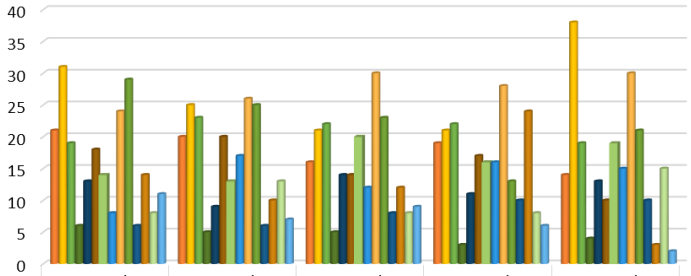
The situation of admitted students in 2018-2022 is shown in Fig. 4.



	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Cu frecvență - cu taxă	14	19	19	15	30
Cu frecvență redusă - fără bursă	93	50	58	56	48
Cu frecvență - fără bursă	14	47	39	43	39
Cu frecvență - cu bursă	101	103	98	100	96

Fig. 4. Types of doctoral students admitted to UTCN during the period evaluated

The distribution of admitted students in the 14 doctoral fields of IOSUD-UTCN is shown in Fig. 5.



	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023
Inginerie industrială	21	20	16	19	14
Inginerie și management	31	25	21	21	38
Inginerie mecanică	19	23	22	22	19
Ingineria materialelor	6	5	5	3	4
Ingineria mediului	13	9	14	11	13
Inginerie electronică, telecomunicații și tehnologii informaționale	18	20	14	17	10
Ingineria sistemelor	14	13	20	16	19
Calculatoare și tehnologia informației	8	17	12	16	15
Inginerie electrică	24	26	30	28	30
Inginerie civilă și instalații	29	25	23	13	21
Arhitectură	6	6	8	10	10
Filologie	14	10	12	24	3
Filosofie	8	13	8	8	15
Matematică	11	7	9	6	2

Fig. 5. Distribution of admitted students by fields in IOSUD-UTCN during the evaluated period

Doctoral studies

The duration of the PhD programme is usually 3 years. For justified reasons, the duration of the doctoral programme may be extended by 1-2 years, with the approval of the University Senate, upon proposal of the doctoral supervisor. The doctoral programme has two compulsory components:

÷ The Advanced Graduate Studies-based Training Programme (PPUA) in the Doctoral School;

÷ Individual Scientific Research Programme (PCS).

In the advanced degree-based training programme, the doctoral student participates in the first year of doctoral studies in activities in 3-4 doctoral degree disciplines. These disciplines are chosen in such a way

that they are all offered in the first year of the doctoral training period and the cumulative duration of the advanced undergraduate training programme may not exceed 3 months. The disciplines in a doctoral student's advanced undergraduate-based training programme are agreed and proposed by the doctoral supervisor together with the doctoral student and approved by the Doctoral Programme Coordinating Board, the UTCN Doctoral School Board and the CSUD Director.

Within the first 6 months after signing the study contract, the doctoral candidate must submit the Scientific Research Project in order to prepare the doctoral thesis. The topic of the Scientific Research Project is determined by the PhD supervisor together with the PhD candidate and is related to the university's advanced training programme, programmes and institutional policies. The research project must contain the general objective and specific objectives of the PhD thesis, research methodology, risk assessment and alternative solutions, estimated timetable of research activities (Gantt diagram of the project), etc. Scientific and financial sustainability of the project is a prerequisite.

In order to ensure a coherent scientific path of the PhD student, 5 oral presentations in front of the PhD supervisor and the supervision committee are planned within the scientific research programme:

÷ in the first year of the doctoral studies, the doctoral student submits the Scientific Research Project (first semester) and a research report, R1 (second semester);
÷ in the second year, the PhD student submits two progress reports on the scientific research activity, R2, R3, and in the third year (sem I) a progress report, R4.

During his doctoral studies, the doctoral student is also supervised/supported by a supervision committee made up of 3 other teaching or research staff from UTCN, who have the title of doctor and at least the position of supervisor, university lecturer or research scientist grade III and who are competent in the subject of the thesis. The main role of the mentoring committee is to guide the doctoral student during the PhD programme in order to prepare the PhD thesis. The mentoring committee meets at least once every 6 months at the request of the PhD student. The doctoral student is obliged to inform the committee of the reasons for requesting a committee meeting and to prepare a short report on the results obtained since the last meeting. The mentoring committee has the following obligations:

÷ to analyze the PhD student's research project and ensure that all the conditions are in place for its realization within 3 years;
÷ to support the PhD student's access to the research infrastructure needed to carry out the research programme;
÷ to promote the national and international visibility of the PhD student by publishing articles and participating in conferences and congresses in the field of the thesis;
÷ to monitor the doctoral candidate's fulfillment of the performance indicators established at the doctoral school level for the award of the doctoral degree;
÷ to support the PhD student, starting from the end of the second year, to prepare his/her professional career;
÷ to supervise the writing of the PhD thesis and to contribute with suggestions and comments to raise its level;
÷ to participate in the defense of progress reports, department/college thesis defense, and public defense.

The doctoral studies are completed by defending the doctoral thesis in a public hearing in front of the committee of analysis and public defense of the doctoral thesis, in accordance with the provisions of the Institutional Regulation on the organization and conduct of doctoral studies at the Technical University of Cluj-Napoca. (see HS 1235) and the Procedure for the completion of doctoral studies at IOSUD-UTCN (see HCA 140-14).

The doctoral dissertation is written according to the standards for writing a doctoral thesis (http://iosud.utcluj.ro/sustinerea-tezei-de-doctorat.html).

A total of 278 PhD theses were defended in 2018-2022. The figures below (6 and 7) show the evolution of PhD thesis defenses in the period 2018-2022.

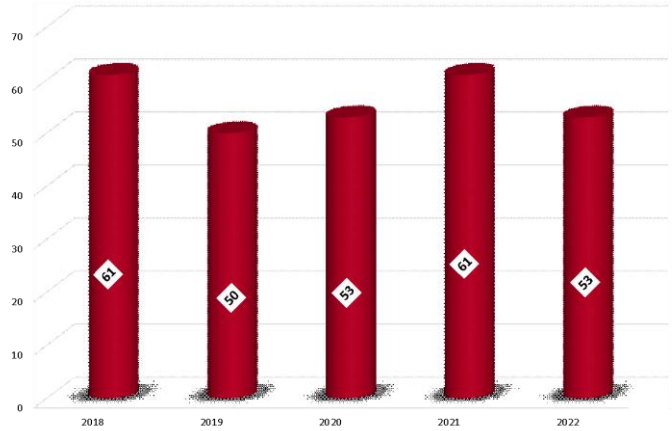
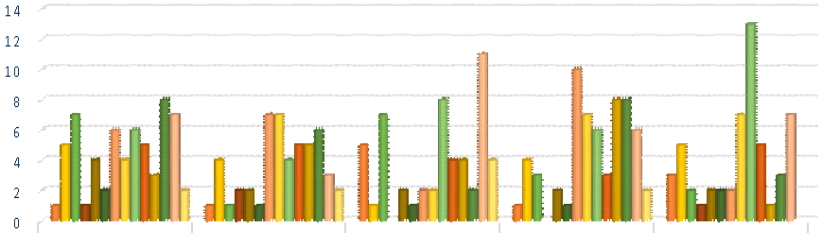


Fig. 6. Evolution of PhD theses defended during the period evaluated



	2018	2019	2020	2021	2022
Arhitectură	1	1	5	1	3
Calculatoare și tehnologia informației	5	4	1	4	5
Filologie	7	1	7	3	2
Filosofie	1	2			1
Ingineria materialelor	4	2	2	2	2
Ingineria mediului	2	1	1	1	2
Ingineria sistemelor	6	7	2	10	2
Inginerie civilă și instalații	4	7	2	7	7
Inginerie electrică	6	4	8	6	13
Inginerie electronică, telecomunicații și tehnologii informaționale	5	5	4	3	5
Inginerie industrială	3	5	4	8	1
Inginerie mecanică	8	6	2	8	3
Inginerie și management	7	3	11	6	7
Matematică	2	2	4	2	

Fig. 7. Evolution of PhD theses by fields defended in 2018-2022

1.1.11.2 Research activity

The Technical University of Cluj-Napoca is one of the 12 universities of "advanced research and education" in Romania, it has as a major objective the involvement in advanced scientific research, the production of significant scientific results, the approach of interdisciplinary and multidisciplinary topics, the integration of research results in the national and international exchange of values, the increase of national and international visibility, but also the attraction and creation of a highly qualified human resource. The University promotes fundamental, applied and innovative research, and research topics cover the fields of engineering, exact sciences and humanities.

Organisationally, research is carried out at departmental level, mainly in the more than 80 internally accredited research structures (see http://research.utcluj.ro/index.php/domenii-de-cercetare.html). The

coordination of scientific research activity is mainly carried out by the PhD supervisors with the broad involvement of all young teaching and research staff, PhD students and students. The research teams are free to choose their topics, but institutionally research aligned with the priority directions of the regional, national and international research - development - innovation strategies is supported. The University is making sustained efforts to set up a research institute in artificial intelligence, and is in the process of obtaining funding to start work on designing the institute. The research activity in the institute will be aligned to the RIS3 smart specialization areas and niches https://www.nord-vest.ro/strategia-de-specializare-inteligenta-a-regiunii-de-dezvoltare-nord-vest-ris3-n-v-2021-2027/, with constant adaptation to national and international trends.

The share of full-time staff involved in research (59.27%) remained almost constant (Table 2), as did the number of PhD students. It should be noted that doctoral students with a significant share of about 40.73% (Tab. 2) are the driving force of research. Attracting and retaining young people of merit is the most important objective that will ensure the growth of excellence in research and can only be achieved mainly by attracting research funding.

Tab. 2. Breakdown of human resources involved in research by teaching function

Function	**2018**		**2019**		**2020**		**2021**		**2022**	
	no.	**% UTCN**	**no.**	**% UTCN**	**no.**	**% UTCN**	**no.**	**% UTCN**	**no.**	**% UTCN**
Professor	158	10,37%	151	9,77%	159	10,30%	151	9.88%	147	9,60%
Lecturer	229	15,04%	257	16,62%	269	17,43%	284	18.57%	290	18,93%
Head of works	367	24,10%	361	23,35%	351	22,75%	345	22.56%	349	22,78%
Assistant	134	8,80%	123	7,96%	111	7,19%	97	6.34%	119	7,77%
Researcher	5	0,33%	5	0,32%	5	0,32%	5	0.33%	3	0,20%
Total staff	**893**	58,63%	**897**	58,02%	**895**	58,00%	**882**	57.68%	**908**	59,27%
Doctoral candidate	630	41,37%	649	41,98%	648	42,00%	647	42.32%	624	40,73%
TOTAL	**1523**	**100.00%**	**1546**	**100.00%**	**1543**	**100.00%**	1529	100.00%	**1532**	**100.00%**

The annual revenues attracted and received through research activity from various competitions (Tab. 3) have seen slight decreases during 2019-2021, and in 2022 there is again an increase of 16.71%. UTCN has continuously carried out and is carrying out projects won through international H2020 competitions, ranking 3rd after UPB in terms of the value of contracts attracted in the ranking carried out by the EU. The increase in funding attracted from the national and international economic environment underlines the constant concern for carrying out research and transferring its results to the economic environment.

Tab. 3. Dynamics of revenue from certain types of research activities

Source of funding	**2018**		**2019**		**2020**		**2021**		**2022**	
	no.	**Value** [THOUSANDS OF LEI]	**no.**	**Value** [THOUSANDS OF LEI]	**no.**	**Value** [THOUSANDS OF LEI]	**no.**	**Value** [THOUSANDS OF LEI]	**no.**	**Value** [THOUSANDS OF LEI]
National competitions	103	14.636	57	13.897	71	12.570	69	12.315	76	11.611
International competitions	15	4.239	30	5.938	41	7.607	38	6.525	32	8.007
Contracts with external firms	13	1.892	27	1.919	13	621	14	345	11	2.120
Contracts with Romanian firms	102	4.130	213	4.760	164	2.419	154	2.842	184	3.972

The funding from the university's own income of internal competitions, research support grants, awards for research results and/or monthly research scholarships are intended by the university management to help, encourage and facilitate the training of younger generations in the formation of research teams and/or for the development of project proposals in strategic areas to attract new funding (Table 4).

Tab. 4. Dynamics of supporting research activities from the university's own income

Financing from own income (Value [RON])	**2018**	**2019**	**2020**	**2021**	**2022**
Internal Competitions and support Grants	734.758	882.351	899.722	961.848	1.792.707
Monthly research grants	353.556	290.756	296.725	455.527	385.991
Supporting Research	-	-	-	892.971	3.427.414
TOTAL RESEARCH	1.088.314	1.173.107	1.196.447	2.310.346	5.606.111

Analyzing the dynamics of research income in terms of the percentage of total income received per university (Fig. 8) shows that this proportion is slightly decreasing, but in absolute terms research income has steadily increased except for 2020 (a possible decrease also due to the economic effects of the pandemic), with a return to the upward trend in 2021.

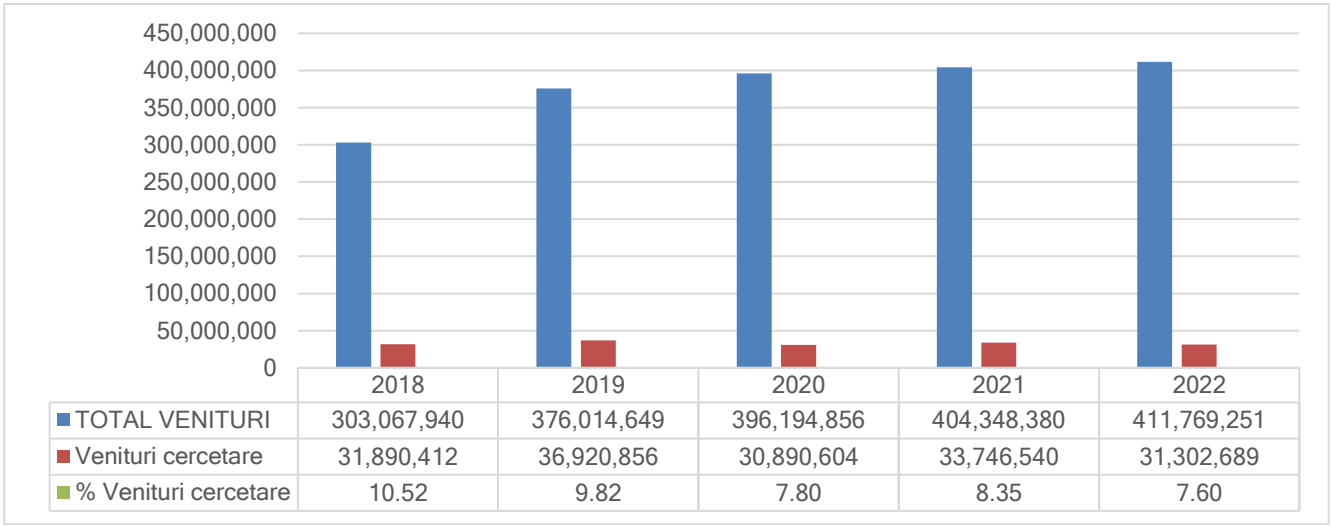


Fig. 8. Evolution of research income in relation to total income received per university (including research projects financed by structural funds)

The results of the scientific research have materialized, in addition to the scientific and technical solutions developed, through scientific publications in prestigious journals and conferences. Fig. 9 highlights the evolution of publications in ISI journals and ISI Proceedings conferences (indexed in WOS). The results for the year 2022, representing 736 publications, are a significant increase compared to those reported in March 2022 for the year 2021 (547 publications). For the WOS platform there is a delay in indexing of more than one year for some of the articles.

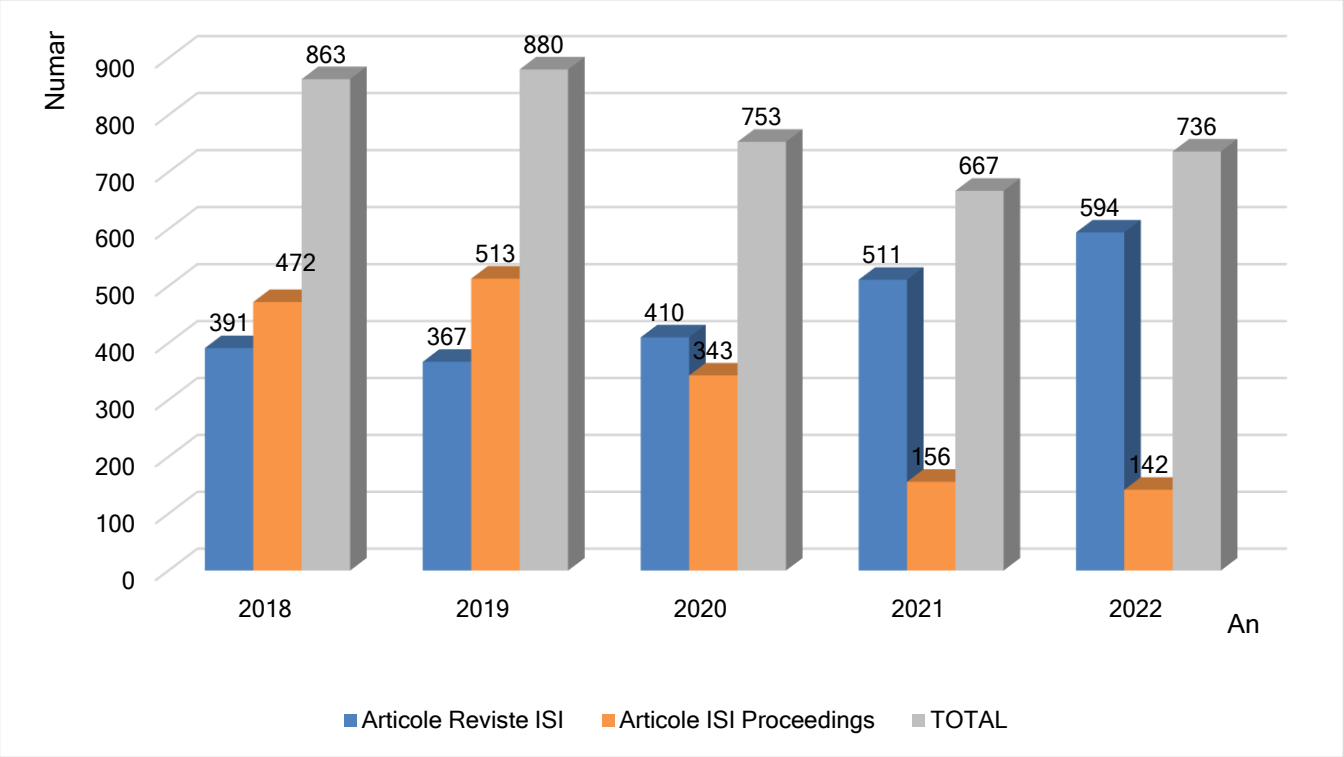


Fig. 9. Evolution of the number of ISI articles in UTCN (according to Web of Science)

The situation of publications in conferences and journals monitored by SCOPUS (Fig. 10) also shows a positive trend, with 1,059 publications in 2022 where the indexing delay is less than for ISI publications. For 2022, there is still a strong trend of increasing the share of publications in journals at the expense of conference publications.

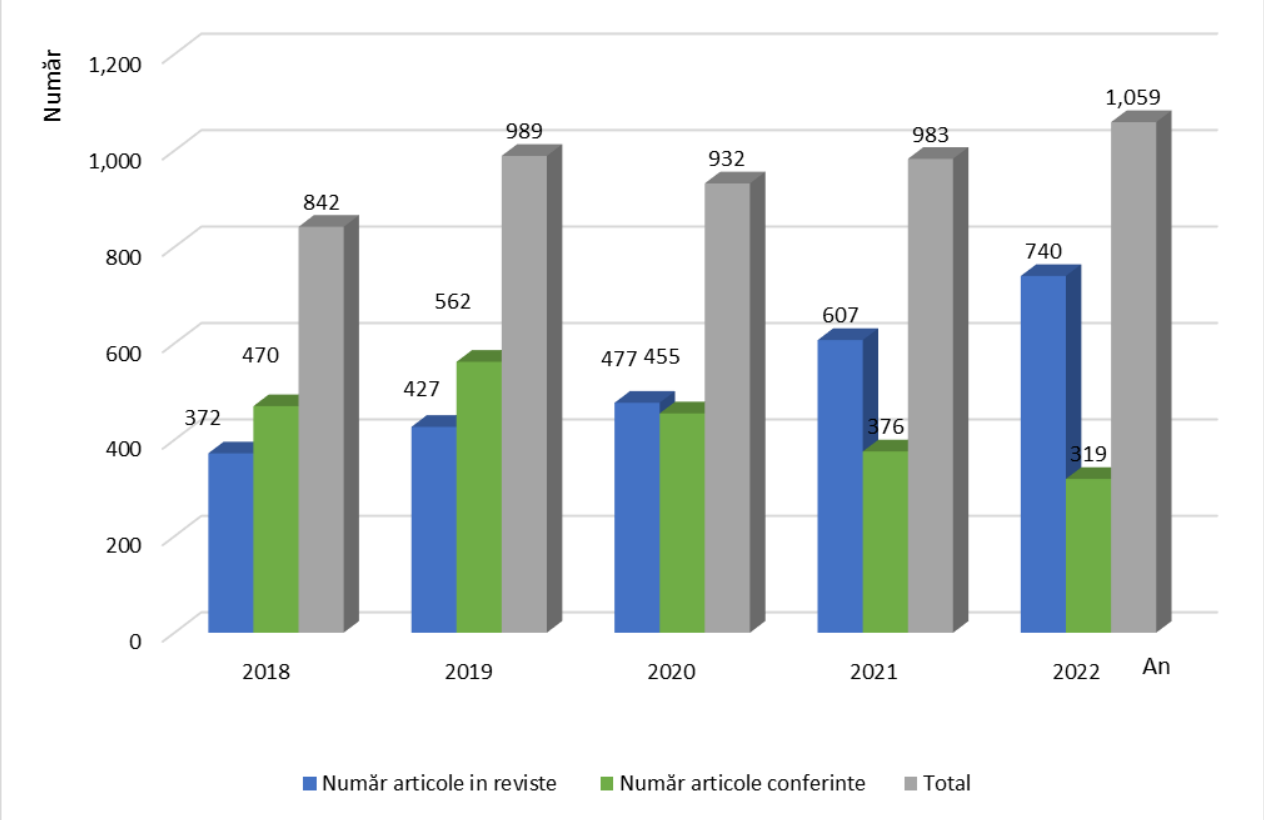


Fig. 10 - Evolution of the number of SCOPUS articles published by UTCN authors between 2018-2022

Significant potential for improvement is highlighted in the patenting activity, which has developed relatively steadily over the years under review. Seventy-two applications were filed and 48 patents obtained. It should be noted that these results are in line with regional and national trends as highlighted in the annual reports of the State Office for Inventions and Trademarks (OSIM) and that UTCN is an important contributor to protected intellectual property in the region it serves.

SCImago Institutions Ranking/SIR (http://www.scimagoir.com) develops an annual ranking of institutions directly involved in research using a composite indicator combining a set of defining variables: research, innovation and impact on society. In the latest published ranking, the one for 2022, a total of 4364 universities are included and UTCN ranks 676th internationally.

National position	International position	University
1	3138	Babes-Bolyai University
2	3219	Politehnica University of Bucharest
3	3255	Iuliu Hatieganu University of Medicine and Pharmacy Cluj Napoca
4	3507	University of Bucharest
5	3765	Carol Davila University of Medicine and Pharmacy
6	3877	Transilvania University of Brașov
7	4222	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca
8	4447	Alexandru Ioan Cuza University
9	4708	University of Oradea
10	5056	Technical University of Cluj-Napoca
11	5340	Ștefan Cel Mare University
12	5377	University of Medicine and Pharmacy Victor Babes

Fig. 11. SCImago national rankings for 2023
(source: http://scimagoir.com/rankings.php?country=ROU&sector=Higher%20educ.)

The University participated in 2019 in the international QS Stars assessment and obtained 4 stars out of five possible, equating to internationally recognized university of excellence, the certification being maintained in 2022.

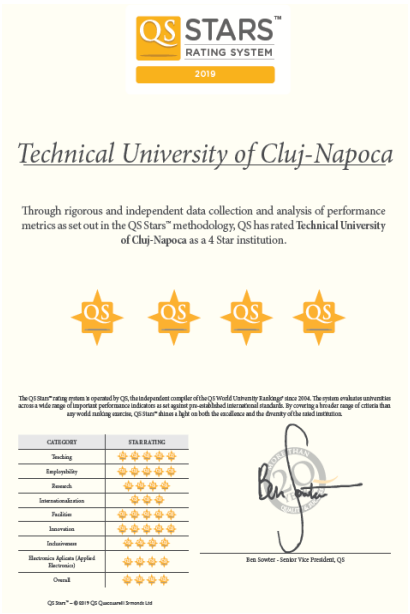


Fig. 12. QS Stars Certification

In the QS ranking by specialization, for the year 2022, out of 1,543 ranked institutions, UTCN ranks as follows: for Electrical and Electronic Engineering, it ranks 351-400th worldwide and 2nd in Romania, for Computer Science 601-650th worldwide and 4th in Romania, and for Mechanical Engineering 301-350th worldwide and 1st in Romania (Figure 13). In the year 2022, UTCN appears in the QS ranking on the main field of Engineering and Technology on the 451-500th place, being in second place in Romania (Fig. 13).

		2020	2021	2022
Engineering & Technology	Engineering & Technology		451-500	451-500
	Computer Science & Information Systems	451-500	551-600	601-650
	Engineering - Chemical			
	Engineering - Civil & Structural			
	Engineering - Mechanical, Aeronautical & Manufactu..	351-400	301-350	301-350
	Engineering - Electrical & Electronic	351-400	351-400	351-400
	Engineering - Mineral & Mining			
	Petroleum Engineering			

		Global Rank	Domestic Rank	Academic	Employer	Citations	H-index	IRN	Score
Engineering & Technology	Engineering & Technology	451-500	2	67.0	54.2	65.5	56.1	66.0	61.9
	Computer Science & Information Systems	601-650	4	36.7	54.9	60.3	50.3		47.7
	Engineering - Chemical			26.3	48.7	53.5	52.1		41.0
	Engineering - Civil & Structural			42.2	60.9	54.3	51.1		51.0
	Engineering - Electrical & Electronic	351-400	2	53.0	56.1	69.0	57.5		57.0
	Engineering - Mechanical, Aeronautical & Manufact..	301-350	1=	64.6	58.4	62.7	50.5		60.3
	Engineering - Mineral & Mining			28.8	21.5	44.9	34.2		29.8
	Petroleum Engineering								

Fig. 13. QS classification fields/specializations, the position of UTCN

In the Times Higher Education ranking, Computing was ranked in the 800+ class and Engineering in the 800+ class worldwide (Fig. 14).

Fig. 14. The World University Rankings 2022 by subject, the position of UTCN

The capitalization of research results and the attraction of economic partners was also achieved through the Centre for Technology and Knowledge Transfer (CCTC) that managed:

- The organization of the UTCN stand at the International Exhibition of Scientific Research, Innovation and Invention PRO INVENT organized by UTCN in 2018, 2019, 2020, 2021 and 2022 facilitated the promotion of technology transfer offers based on patents and patent applications in the environment of innovative companies and the media. (https://proinvent.utcluj.ro/);
- Participation in national and international invention fairs and promotion of excellent research results has brought numerous awards and medals:
    - 6th Annual International Invention Innovation Competition in Canada, iCAN 2021, 2022 Toronto
    - International Invention & Trade Expo London, ITE 2022, 2022 London
    - 46th International Invention Show Budi Uzor Inova Croatia, inova 2022, 2022 Osijek
    - Asianinvent Fair Singapore, Singapore, ediția 2020;
    - Bangkok International Intellectual Property, Invention, Innovation and Technology Exposition (IPITEx 2019), Thailanda, edition 2019;
    - INFOINVENT Fair, Chiandnău, Republica Moldova, edițiile 2017, 2019, 2021;
    - INVENTICA Fair, Iaand, România, editions 2016, 2017, 2018, 2019, 2020, 2021; 2022;
    - EUROINVENT Fair, Iaand, România, editions 2016, 2017, 2018, 2019, 2020, 2021; 2022;
    - Cadet INOVA Fair, Sibiu, România, editions 2017, 2018, 2019, 2020, 2021; 2022;
    - "Traiana Vuia" Fair, Timișoara, România, editions 2017, 2020, 2021; 2022;
    - ICE-USV, Suceava, România, editions 2017, 2018, 2019, 2020, 2021; 2022;
    - InventCor, Deva, România, editions 2022
- Conducting training sessions on intellectual property issues with company managers and researchers from UTCN and the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca (USAMV);
- Collaboration with OSIM specialists for the development of 6 sessions of Intellectual Property Prediagnosis, Cluj-Napoca, 20-22 March 2019;
- Organizing UTCN Research Conferences, conferences focused on presenting the most representative results obtained from the research activity carried out in UTCN in 2017-2021;
- Developing brochures presenting the offer to the economic environment;
- Creation of a dedicated technology transfer section on the research website;
- Diversification of the information services offered by the Regional Centre for the Promotion of Industrial Property PATLIB Cluj, which operates under the umbrella of CTTC, via access to the EU IPR Helpdesk network, which is interconnected with the Enterprise Europe Network (CTTC has a member in this network which started its activity in 2013);
- Diversification of the information services offered by the Regional Centre for the Promotion of Industrial Property PATLIB Cluj, which operates under the umbrella of CTTC, via access to the EU IPR Helpdesk

network, which is interconnected with the Enterprise Europe Network (CTTC has a member in this network which started its activity in 2013);

- Accreditation of the Centre for Technology and Knowledge Transfer (CTTC) by the Ministry of Education and Research as an innovation and technology transfer entity on 11 February 2020 for a period of 5 years.
- Running of the support center for scientific excellence within the project "CeS - Scientific Excellence and Smart Specialisation through the creation of a Support Centre dedicated to facilitating the access of public and private entities to RDI projects/competitions", Competitiveness Operational Programme, Priority Axis 1. Regular workshop sessions were organized where researchers from the university and from companies presented their experiences in European projects or in the process of elaboration and submission of these projects.

The research activity carried out by the UTCN academic community has been rewarded by numerous research awards, among which we mention the Romanian Academy awards obtained between 2017 and 2021:

1. Radu Dănescu, "Perception through particles", the CONSTANTIN BUDEANU prize for 2019, awarded in 2021, in the field of Technical Sciences;
2. Nicolae Ursu, FISCHER and Mihai URSU, "Numerical Methods in Engineering" TRAIAN VUIA prize for 2019, awarded in 2021, in the field of Technical Sciences;
3. Cornel BRIȘAN, Cătălin BOANTĂ and Veturia CHIROIU, "Introduction in optimisation of industrial robots: theory and applications", HENRI COANDĂ prize, 2019, awarded in 2021, in the field of Technical Sciences;
4. Ioan Salomie, Tudor Cioară and Ionuț Anghel, "Smart solutions for energy ecosystems", the CONSTANTIN BUDEANU prize for 2018, awarded in 2020, in the field of Technical Sciences;
5. Lucian Lăzărescu, "Design of technologies and matrices for sheet metal processing", AUREL VLAICU Prize for 2017, awarded in 2019, in the field of Technical Sciences;
6. Arthur Daniel Costea and Robert Varga, "Multimodal, multiresolution environment perception methods for mobile autonomous systems", CONSTANTIN BUDEANU award for 2017, awarded in 2019, in the field of Technical Sciences
7. Petru Berce, Nicolae Bâlc, Dan Leordean, Cristina Borzan, Horea Chezan, Voicu Mager and Cristian Berce, "*Medical applications of additive manufacturing technologies*", HENRI COANDĂ prize for 2015 awarded in 2017 in the field of Technical Sciences;
8. Doina-Liana Pîslă, Nicolae Plitea and Liviu-Călin Vaida, "Innovation in medical parallel robots", the TRAIAN VUIA prize for 2020, awarded in 2022 in the field of Technical Sciences;
9. Anghel Stanciu and Florian Roman, FOUNDATIONS, vol. 3: Support Structures in Geotechnical Engineering, ANGHEL SALIGNY Award, year 2020, awarded in 2022 in the field of Technical Sciences.

1.1.12 Research infrastructure and the awarding of research grants

UTCN research structures have a significant material basis which is presented both on their own websites and on https://eeris.eu/

The access of doctoral students from the 14 doctoral fields of IOSUD-UTCN to the research resources of the research structures is stipulated in various regulations for doctoral studies:

÷ Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca (HS 1235), also posted on the website:

http://utcluj.ro/media/decisions/2020/10/02/REGULAMENT_Institutional_Doctorat.pdf.

÷ Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (HCA 68-5), also displayed on the website:

http://iosud.utcluj.ro/files/Legislatie/Regulamente%202019/REGULAMENT_Scoala_Doctorala_CA_CSUD_23.01.19.pdf

÷ The contract for doctoral studies (Model Contract), also displayed on the website: http://iosud.utcluj.ro/files/Files/Admitere/Contracte%202020/14_Contract_cadru_studii_doctorale_2020%20D._Arhitectura.pdf

Providing the necessary resources for doctoral training is an obligation of UTCN, IOSUD-UTCN, the UTCN Doctoral School, the Coordinating Councils and the faculties responsible for each field.

The Technical University of Cluj-Napoca supports PhD students and postdoctoral researchers by awarding research grants, which is reflected in the Methodology for awarding grants posted on the university's website. (see HCA 03-02).

1.1.13 Human resources

The number of PhD supervisors in IOSUD-UTCN is 202 and the total number of PhD students is 1364. The distribution of supervisors by the 14 CNATDCU PhD fields is given in Tab. 5.

Tab. 5. Distribution of supervisors by doctoral fields

no.	The fundamental area of hierarchy	Doctoral field	No. of PhD supervisors
1	Humanities and arts	Architecture	7
2	Humanities and arts	Philosophy	5
3	Humanities and arts	Philology	5
4	Engineering sciences	Computers and information technology	13
5	Engineering sciences	Materials engineering	9
6	Engineering sciences	Environmental engineering	6
7	Engineering sciences	Systems engineering	17
8	Engineering sciences	Civil engineering and plumbing	11
9	Engineering sciences	Electrical engineering	37
10	Engineering sciences	Electronic engineering, telecommunications and Information technologies	24
11	Engineering sciences	Industrial engineering	18
12	Engineering sciences	Mechanical engineering	26
13	Engineering sciences	Engineering and management	13
14	Mathematics and Life Sciences	Mathematics	11

UTCN has been organizing habilitation thesis defenses in the 14 accredited fields since the academic year 2013/2014. In the period 2018-2022, a total of 43 habilitation theses were defended (Fig. 15), both by academics from UTCN and from other universities and national research centers. UTCN financially supports habilitation support by reducing the habilitation fee for UTCN employees (see HCA 149-7), and from 19 January 2021, the habilitation fee is fully refunded after obtaining the habilitation certificate, affiliation to the UTCN Doctoral School and enrolment of at least one doctoral student. (see HCA 112-10).

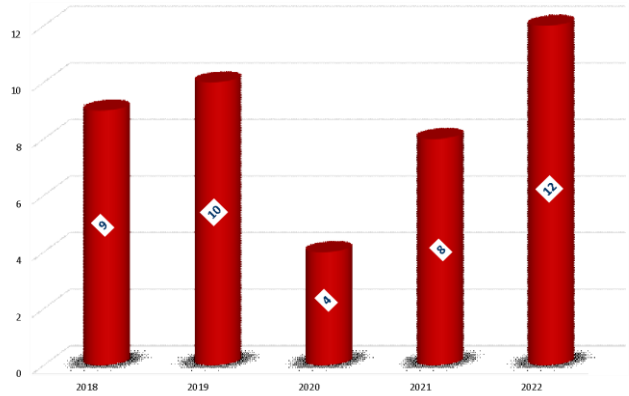


Fig. 15. Theses defended between 2018 and 2022

Annexes: HCA 149-7; HCA 112-10.

1.1.14. Services for doctoral students

Public information accessibility for PhD students

The web platform of IOSUD-UTCN (http://iosud.utcluj.ro) is addressed to PhD students of the Technical University of Cluj Napoca. Since the launch of the platform until now, 279516 hits have been registered on the information about the qualification of teachers and researchers, confirmation orders and other relevant information for the interested public. The application is very useful for internal and external academia as all information is centralized in one platform. The information posted on the Doctoral School's website currently refers to all categories of public coming to or working within the university. Since the last redesign of the IOSUD-UTCN website, changes have been made to all the structures that make up the site. The information is regularly updated, so that a significant increase in the number of visitors to the site has been observed. Coherence and transparency of information of public interest is also ensured through efficient and correct communication, with press releases and all events for the awarding of doctoral degrees in a festive setting as communication tools. Social media channels complement real-time communication through constant interaction with doctoral students, the academic community and the general public.

Leaflets presenting the PhD programmes were produced in Romanian, English and French, with the possibility of annual updating and re-edition, as well as graphic materials for participation in educational fairs.

Since the academic year 2020/2021 the registration of candidates for admission has been carried out online via the platform doctorat.utcluj.ro. Currently, the platform manages data on admission, mentoring committee, contracted disciplines, research topic and other information for PhD students admitted in the academic year 2020/2021 and is continuously optimized to include all information regarding the PhD internship and PhD thesis completion (PhD thesis summaries, composition of public defense committees, date and place of defense) for all PhD students in the UTCN Doctoral School.

The university library and publishing house

The provision of adequate teaching materials and access to state-of-the-art fundamental and specialist knowledge is a necessity for quality education and valuable research. Through the acquisitions made and the correct management of the existing book collection, the UTCN Library, present in all the locations of the university (Cluj-Napoca, Baia Mare and extensions), ensures access to over 586,000 volumes for students, teachers and researchers (Bib Books). UTCN also has bilateral exchange agreements for journals (Bib Magazines).

Online links to the library:

÷ https://viziteaza.utcluj.ro/editura.html

- https://biblioteca.utcluj.ro/prezentare-editura.html
- https://biblioteca.utcluj.ro/materiale-editura.html
- https://biblioteca.utcluj.ro/carti-online-cu-coperta.html
- https://biblioteca.utcluj.ro/prezentare-biblioteca-CUNBM.html

UTCN is also an institutional user of the national ANELIS Plus system, which allows the academic community access to a wide range of international databases containing the latest scientific articles. Through the subscription purchased, the academic body of the university has access to the following databases: American Institute of Physics Journals, American Physical Society Journals, IEEE All-Society, Institute of Physics Journals, OXFORD Journals, PROQUEST Central, Science Direct, SCOPUS, Springerlink Journals, Thomson Web of Knowledge REUTERS and Wiley Online Library.

According to CA Decision 9/15.01.2019 (HCA 68-9) all doctoral students at IOSUD-UTCN have free electronic access to scientific and research literature through the ANELIS Plus portal.

Starting with the academic year 2019/2020, the new form and structure for doctoral and habilitation theses has become mandatory, and the publication costs in the U.T.PRESS publishing house for these theses are provided by the Technical University of Cluj-Napoca for a number of 25 copies, for theses of maximum 200 pages, according to HCA 77-9.

Annexes: BIB-Magazines (journal subscriptions); BIB-Book (book fund); HCA 68-9; HCA 77-9.

1.1.15. International relations

The development of international relations is one of the main development directions identified in the Strategic Plan 2018-2022 as well as in the UTCN Strategy 2024, and the intensification of doctoral student exchanges, the increase in the number of foreign doctoral students enrolled at UTCN as well as the positive dynamics of staff exchanges reflect this approach.

The University believes that mobility mechanisms and programmes such as Erasmus+, CEEPUS, the Francophone Academic Area, etc. contribute directly to the quality of the University's educational processes, its higher prestige and improved visibility in the European Higher Education Area.

The European University of Technology - European University of Technology - EUt+ type project, which runs from 2020 to 2023, is laying the foundations for a new type of university, active at local, regional and European level, which will generate excellence and added value for European society, economy and culture. The project is coordinated by the Université de Technologie de Troyes, (France) and includes, alongside UTCN, the following universities: Technical University of Sofia (Bulgaria), Cyprus University of Technology (Cyprus), University of Applied Sciences Darmstadt (Germany), Riga Technical University (Latvia), Technological University Dublin (Ireland), Universidad Politécnica de Cartagena (Spain).

The European University of Technology, through the synergy of its members and partners, has ambitious goals in terms of doctoral studies and research, such as: the creation of a common EUt+ curriculum at bachelor, master and doctoral level which will eventually lead to a single EUt+ degree, the full integration of the programmes of the eight universities in order to offer students the choice of campus and the way of acquiring ECTS credits, the facilitation of student mobility on the basis of a single European Student Card which will provide access to all services (libraries, sports and recreational facilities, accommodation) on all eight campuses, similarly, the creation of a single professional EUt+ card for academic and administrative staff of the universities in the consortium to ensure access to all services on all eight campuses, the development of joint research laboratories, the development of a common infrastructure (library resources, databases, learning and research platforms, etc.).).

Based on the results achieved in the work packages and planned activities, the relevant documents were signed: Memorandum of Understanding: Toward a single University, Memorandum of Agreement

(MoA) for the creation of the European Research Institutes, the related EUt+ University Research School and the supporting research office, MoA Cluster Wave II, MoA for the creation of the EUt+ Bachelor of Engineering and Master of Engineering programmes, EUt+ Agreement for the Creation of the EUt+ Innovation & Technology Transfer Office, EUt+ Agreement for the Creation of the EUt+ European Research Office. An important step in the development of the project was the creation of clusters for the different specializations, in which the curricula were harmonized and the main competences specific to these specializations were established, and a "map" of mobility was drawn up for the recognition of certain disciplines between the partner universities. Several series of conferences on Sustainability and Data Science were organized to prepare future European research institutes, as well as a series of courses/conferences on European identity. Partner universities in the EUt+ consortium applied for funding for several projects to support the EUt+ initiative, with the EthiCo, Ludeia, EutiNN and Aestehico projects being awarded in 2021, where several workshops and conferences were organized under the Think Human First umbrella: Humanity in the Day Beyond Tomorrow, EthiCo Intensive programme (programme for students on ethics in technology), etc.

On the Francophone front, the International Relations Office supported the organization of a number of events and conferences of a high scientific level, including:

- Cycle of conferences "Recontres Europeenes de Transylvanie - Comment reusir la transition vers une ville plus durable?", organized in collaboration with the French Institute in March 2018;
- The debate on "The digital revolution and artificial intelligence: what challenges the future brings", organized in collaboration with the French Institute in January 2019.

The ERASMUS+ Office coordinates and promotes the European Commission funded programmes in the field of vocational education and training within UTCN, ensuring the optimal framework for the participation of students and the academic/administrative community of the university. The main area of activity is the Erasmus component.

Attention was paid to promoting the educational offer at doctoral studies level by increasing the visibility of the fields offered by UTCN, as a result of participation in educational fairs and campaigns to promote these programs, by translating the UTCN website and by updating the information on the platform. http://studyinromania.gov.ro

Thus, in the period 2018-2022, UTCN was present at the following major international fairs, where doctoral studies were promoted: Education and Career 2018 and Education Abroad, in Kiev, Ukraine; Study in Romania, Dubai, United Arab Emirates, February- March 2018; Study in Romania, Rabat and Casablanca, Morocco- March 2018; Romanian Universities Fair, Chisinau, 2018; Study in Romania- Asghabat. Turkmenistan- July 2018; EAIE Conference and Exhibition Geneva, September 2018; Campus Romania- Tunis, Tunisia- October 2018; NAFSA 2019 Annual Conference and Exhibition, Washington- May 2019; EAIE 2019 Annual Conference and Exhibition, Helsinki- September 2019; Kazakhstan International Education Fair- Nur Sultan, Shymkent, Almaty- October 2019; Global Education Fair, Vietnam- October 2019, Romanian Universities Fair, Chisinau - July 2019, International Education Exhibition Ashgabat - November 2019, International Education Fair Kazakhstan - October 2019, Astana, International Education Fair Kazakhstan - October 2019, Shymkent, International Education Fair Kazakhstan - October 2019, Almaty.

The year 2020 was marked by UTCN's presence at several virtual educational fairs: Study in Europe - virtual fair Singapore, September 2020, RIUF virtual fair - October 2020, Vietnam Education Fair - December 2020, ABC Fairs - online fair for Central Asia region (Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan, Azerbaijan) - June 2020, BeginGroup Eurasia region (Azerbaijan, Georgia, Ukraine, Belarus) - October 2020, BeginGroup Central Asia International Fair (Kazakhstan, Kyrgyzstan, Uzbekistan) - November 2020, ABC Fairs online fair for the French-speaking Africa region, June 2021, Begin Group Fair for the North Africa region, September 2021, Begin Group International Fair for Central Asia, June 2021, Romanian

Universities Fair, held in Chisinau, July 2021; International Education Fair Kazakhstan - April 2022; EAIE Spain - September 2022; Ukrainian Educational Fair - November 2022; Vietnam Education Fair - November 2022; A2 International Fairs Morocco - November 2022; A2 International Fairs Azerbaijan - November 2022.

Doctoral studies at UTCN have been promoted in the activities resulting from the organization of International Week at UTCN in 2020 (online) and other events such as International Students Days, Student for One Day, International Information Days organized annually.

In the period 2018-2022, each year FDI projects were proposed and accepted for funding, under area 2: Internationalization, which have foreseen, planned and implemented specific activities to support the internationalization of doctoral studies, such as:

÷ Stimulating international mobility of PhD students to increase research capacity and international visibility, provided through language support in the form of tutoring and English language workshops/courses. Tutoring consists of linguistic revision, preparation for publication of papers/posters/ speeches/ presentations written by authors. Language support activities were also carried out. The following courses were organized: Oral skills for teaching in English - an English language course to develop oral communication skills and Advanced grammar and structures for teaching in English - an English language course to improve the fluency and grammatical accuracy of communication in English at advanced level, oriented towards academic discourse specific to research activities, in which PhD students could enroll.

÷ The improvement of services for international students was ensured through: English language courses for administrative/non-teaching staff, organization of Welcome Day events for international students, development of online applications on the International Relations Office website;

÷ Purchase of books, monographs, manuals and subscriptions to specialist journals published in international languages;

÷ The dynamization of publications in prestigious journals and the participation of UTCN PhD students in international (onsite/virtual) conferences was ensured through financial support granted to PhD students selected on the basis of objective criteria. Funds were provided to cover the costs of participation fees, publication fees, transport, accommodation.

UTCN supports the conclusion of doctoral thesis cotutelle agreements, with a total of 16 international cotutelle agreements concluded during the reporting period.

1.1.16 Cooperating with the socio-economic environment

According to the University's Strategic Plan 2020-2024, the relationship with the socio-economic environment is one of the four main areas of action supporting the University's mission (teaching, research, relationship with the socio-economic environment and international relations) for which measures are foreseen to be implemented and monitored through annual operational plans.

The institutional construct for the Relationship with the socio-economic environment "University Strategy in relation to the socio-economic environment" was created and approved as a document by the UTCN Board of Administration. Department for the Relationship with the Socio-Economic Environment (CRMSE), established in 2016, supports communication and institutional collaboration between UTCN and its socio-economic partners at local, regional, national and international level. The "Regulation on the organization and functioning of the CRMSE" has been developed as a framework regulation for UTCN's relationship with the socio-economic environment.

In 2017, the Advisory Committee, a body of the UTCN Rector's institution, was set up in an advisory role, as an interface between the university management and the socio-economic environment of insertion. The members of the Advisory Committee are representatives of important economic agents in the region

where UTCN is present: AROBS Transilvania Software, German-Romanian Economic Association for the North-West Region, Banca Transilvania, Bosch Group, Comelf, CON-A, Diferit, Electrogrup, Emerson, Star Transmission (STC) & Star Assembly (STA), Tenaris Silcotub Zalău, Universal Alloy Corporation Europe.

The foundations have been laid for the tools needed to carry out activities specific to relations with the socio-economic environment, by:

- improving the functionality and constantly updating the content of the website (http://crmse.utcluj.ro/) and the Facebook page (https://www.facebook.com/Compartimentul-pentru-Relatia-cu-Mediul-Socio-Economic-UTC-N-102630301485084) of the Microsoft Teams online platform "Socio-Economic Relations Department" (CRMSE), as well as the digital totems;
    - totems have been technically and software updated;
    - updating in the Microsoft Teams online platform of the dedicated team: the "Department for Relations with the Socio-Economic Environment", in which approximately 17,000 students work and where information is regularly posted with announcements on workshops, courses, presentations organized by the economic environment, internship offers, job offers, as well as announcements promoting the actions of UTCN projects in partnership with companies.
- initiating, drafting, approving and monitoring cooperation contracts.

Within this framework, the strengthening and development of relations with the organizations of the socio-economic environment is carried out, with the aim of participation of the university in the regional development and society, by:

- identify companies in the region and research groups in the university that are interested in collaborating in the transfer of knowledge, and enter the information into the database according to the established structure;
- development of the contact database -> more than 150 companies in 2022;
- the conclusion in 2022 of more than 400 new collaboration/partnership contracts with companies, including: 96 CRMSE framework contracts + 50 CTFS framework contracts + 61 ANTREDOC + 38 PAVING project, as well as more than 250 active contracts.

The CRMSE compartment database was used during 2022 to support:

- the organization of the "Companies' Podium" section at the International Exhibition of Inventions and Research - PRO INVENT 2022, 20th edition, which took place at the Multipurpose Hall BT Arena, from 26 to 28 October 2022;
- the programme **"UTCN 2021 - Excellence in engineering"**;

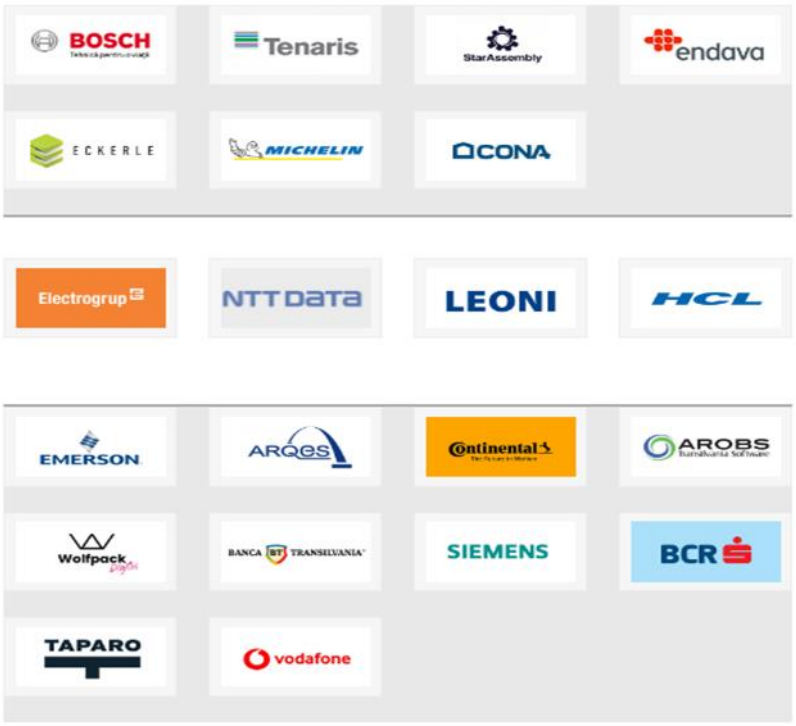
÷ the implementation and submission of projects financed by structural funds, EUt+;

- the implementation of the project CNFIS-FDI-2022-0442, Engineers for tomorrow in the context of the new industrial revolution - NextIng: this has as its target area the matching of educational offer with labor market demand, career counseling and guidance. Actions and results in the project:
    - Conducting studies and analysis at the level of employers - role in identifying their main requirements regarding the skills of graduates and their employability process: 95 UTCN companies completed the survey questionnaire;

- implementation of the project "Bachelor's thesis of the specialization": the 17 best bachelor's theses submitted in the 2022 session and entered in the competition for UTCN NextIng scholarships were awarded; the theses were evaluated from a socio-economic perspective by representatives of the socio-economic environment (https://crmse.utcluj.ro/index.php/anunturi/tucn-nexting-scholarship-award-ceremony-december-5th-2022.html)

- national trips: Alba Iulia (5 UTCN employees) and international trips: Israel, Germany, Cyprus, Greece (15 UTCN employees);
- Supporting the adaptation of curriculum content through the purchase of books: 45 textbooks purchased.

- The implementation of the programme „UTCN 2022 - Startup an Engineer" (https://www.utcluj.ro/universitatea/startup-an-engineer/)



- communication with the UTCN ALUMNI community.

Currently, UTCN is a founding member or partner in 16 regional clusters, of which 6 partnerships were added in 2016-2020, namely: the Transylvania Creative Industries Cluster; Eco - Cluster; DRIFMAT Cluster - distributed research infrastructure for materials, applications and technologies of the future; C-EDU Education Cluster (first education cluster in Romania - weekly meetings, participation in StartupCity Malaga, on 24 November 2021); SpaceTech Transylvania Cluster; Pro-nzeb Cluster. UTCN participated in the AGM meetings of the clusters: Mobilier Transilvan, Transilvania IT, Cluj IT, Cluster of Creative Industries Transylvania and has constantly contributed to the development of their projects.

UTCN is also an active partner in the preparation of projects in the two Digital Innovation Hubs (DIH) in the North West Region, namely: the Digital Innovation HUB for Society - DIH4S and the Transylvania Digital Innovation HUB, which, following the evaluation and decision of the European Commission, are members of the European Network, which is an essential step in the successful implementation of the Digital Europe Programme, the first funding programme of the Multiannual Financial Framework dedicated to the digital sector. UTCN has been involved in projects with impact for the local community, such as participation in the Commission of Strategy for Digitization, coordinated by the Cluj-Napoca City Hall, or participation, in collaboration with the Cluj-Napoca City Hall and the socio-economic environment, for the writing of the "European Capital of Innovation" candidacy.

The association of state and private institutions with the academic environment led to the development of events and projects related to education: Rural Urban Hub, StartUp City Cluj-Napoca, The Science Café and Women in Tech.

At the institutional level, UTCN has been selected in the HEInnovate project, and the analysis of the results contained in the Organisation for Economic Co-operation and Development (OECD) committee report on UTCN and Romania in the country report is available at: http://heinnovate.eu/sites/default/files/oecd_ec_supporting_entrepreneurship_and_innovation_in_higher_education_in_romania.pdf.

During the working of the Advisory Board, issues related to increasing UTCN's competitiveness in the local and European context were discussed. By expanding technology research in several areas, such as artificial intelligence, smart specialization or smart digitization, it will bring both benefits to students and the development of international collaboration at the institutional level. Emphasis has been put on the concept of "Start-up UTCN", with the aim of supporting the development of entrepreneurial and intrapreneurial approaches, at management level, in relation to the business community, as well as entrepreneurial education and dynamic preparation of students for the labor market. The **UTCN Start-up Guide** was presented.

During this period the educational offer has been updated and correlated with the requirements of the labor market and through the development of masters in collaboration with the economic field: ***Management and quality engineering***, in which courses are held by **recognised experts in the field from Germany, Austria and Romania;** *Welding and material quality assurance,* developed in collaboration with the Romanian Welding Association; *Advanced Techniques in Automotive Engineering* and *Management and control in automotive engineering***,** in collaboration with Porsche Engineering Romania; *Advanced electrical systems and structures*, in partnership with Renault Technologie Roumanie and Robert Bosch.

Knowledge and technology transfer has been achieved through the provision of laboratories, research/consultancy contracts, courses for students by industry specialists (course "Autonomous driving: Technology, Dynamics and Control", organized by the Department of Automation of the Faculty of Automation and Computers of UTCN, in partnership with Robert Bosch; Google Digital Workshop - digital training program organized in partnership with UTCN - Student Entrepreneurial Society; financial education workshop).

New laboratories were set up in 2019 with the support of economic partners:

- LoRa Gateway - Orange Romania; Emerson laboratory - Dorobantilor; BosCh laboratory - advanced technology, Bosch corner.
- To achieve knowledge and technology transfer by **equipping** some **laboratories**:
  - On 7 January 2022, the new EMERSON Laboratory - "Industrial Process Automation Solutions" of the Faculty of Automatics and Computer Science, located in the building at 71-73 Calea Dorobantilor, was inaugurated and its equipment continued during 2022;

  - On 16 November 2022 the inauguration of the new "Lighting Applications Laboratory" - Signify (formerly known as Philips Lighting) took place in the building of the Faculty of Installation Engineering, B-dul 21 Decembrie 1989.

Joint events and meetings have been organized which have contributed to the development of collaborative relationships and facilitated the transfer of knowledge to and from socio-economic organizations in order to:

✓ the awarding of scholarships to students by companies (e.g. Robert Bosch scholarships, Renault Technologie Roumanie, Star Transmission Assembly, "Roberto Rocca" scholarships offered by Tenaris Silcotub, TechLounge - InnovationLabs), as well as awards for undergraduate work;

✓ support activities from companies for the organization of student competitions (e.g. collaborations with Romanian-American Foundation, Innovation Labs, Entrepreneurial University);

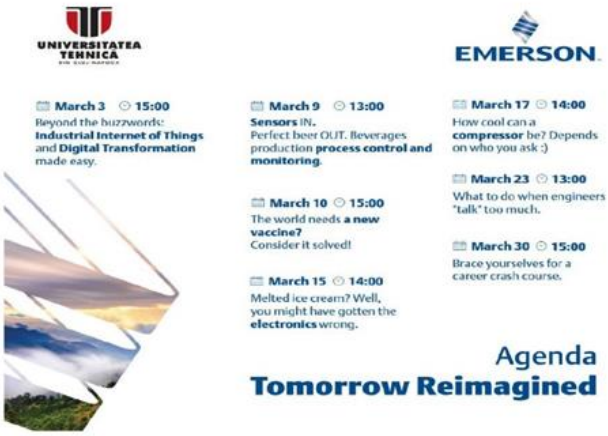
✓ transparency of job offers, through the recruitment platform offered by SmartDreamers or Infomunca, with job and application opportunities for students;

✓ participation in joint local, regional, national and international development projects such as: Interreg; POR; POCU; POC.

✓ participation in events and conferences in partnership or with the presence of the economic environment and UTCN, through faculties or departments: *Discover your passion in IT - 2022 8th edition; 23 UTCN students beneficiaries of Roberto Rocca Education Program scholarships 2022-2023;*

÷ development of the **"Company Month"** project coordinated by CRMSE, through technical and non-technical webinars for students, interactive sessions and workshops:

- March 2022 - Emerson Company Month at UTCN, "Tomorrow Reimagined", during which students participated in over 11 events and workshops:



- April 2022 - Bosch Company Month at UTCN, *"LikeABosch Experience"*, where students participated in over 32 events and interactive sessions:

- November 2022 - Endava Company Month at UTCN: 13 events and technical workshops were held and appreciated by students:

- November 2022 - CON-A Company Month at UTCN: 6 events and workshops were held for UTCN students:

- events organized by companies for UTCN students:
  - 15.02.2022 „Model-Based Academy", organized by Porsche Engineering Romania;;
  - 22.02-18.03 2021 „SNEAK PEEK", technical webinars organized by Tenaris Silcotub for UTCN students;
  - 01.04.2021 „VITESCO Technologies and You", an online workshop organized by Vitesco Technologies Romania, for UTCN students with technical studies profile;
  - 01.04-08.08 *„UNbreakable România"*, summer season, it is a national cybersecurity competition for students and undergraduates with active participation of UTCN students and academics;
  - 06.05-02.06.2021 „Mars - IT's time to lift off your career" organized by NTT DATA, course programme for students;

- 09.06.2021 - What does *"A day at work in Continental Sibiu?"* look like;
- 17.05-30.09 - *„Build Your Robot"* is the slogan with which STRATEC company launches its internship program
- 12.07-17.09.2021 - As every year, Tenaris Silcotub company organizes internship for UTCN students
- 28-30.08.2021 First Tech Challenge organizes the national robot competition, for high school students, in which UTCN had judges in all selection stages;
- 01-30.09.2021 *„BT Code Crafters"* is the internship program organized by Banca Transilvania;
- 19.10.2021 - *„DpIT 7.0 Academy Applications Exhibition"* was held, the organizer Discover your passion in IT;
- 28.10-12.12.2021 UNbreakable Romania, the autumn-winter edition, is a national cybersecurity competition addressed to students and students with active participation of UTCN students and academics;
- 26-28.11.2021 *„DefCamp Capture the Flag"* organized by DelfCamp, which is the fiercest and most rebellious CTF security competition in Central Eastern Europe;
- 05.11.2021 *„Start your career as a Digital Engineer"* is an internship program of HCL;
- 05.12.2021 *„Kick Off your STEM Career"* - Emerson's mentoring programme, now in its 3rd year;
- 09.12.2021 Workshop Continental Sibiu - *„Industry 4.0 - Continental behind the scenes"*;

- 01.03-30.04.2022, „Healthy Start-Up", a project through which the best business ideas from the North-West, Centre and North-East Regions received funding;
- *01.03-31.05.2022, „UNbreakable România" - a national cybersecurity program for high school and university students in Romania, with the active participation of UTCN students and teachers;*
- 02.03.2022, „Idea JAM Cluj UTCN & UMF powered by Innovation Labs 2022", event where innovative start-up ideas were awarded;
- 07-16.03.2022, The Francophone Business Club of Cluj, together with the universities of Cluj and the Agence Universitaire de la Francophonie (AUF), have launched a call for projects addressed to students within the Academia Innova competition.;
- 04-06.05.2022, *„May the 4th be with you!"* - Q_PERIOR SAP Technology Hackathon;
- 08-10.04.2022, „#SustainCityHack" Hackathon, an event organized by the French Embassy on mobility, regeneration and urban planning in Romania.

- *25-27.05.2022, „EnTReC Energy Days", an event organized with the aim of facilitating access by the socio-economic environment to research results from projects funded mainly by the Horizon 2020 programme;*
- *25-27.05.2022, „IDENTICOM4", International Technology Fair for UTCN students and teachers, held at Cluj Innovation Park;*
- *03.06.2022, „We Love STEM Day", an Emerson event for pupils, students and all innovation enthusiasts.*

The University has been part of important events as a participant, exhibitor or organizer, such as:

- *Cluj Innovation Days* (2017, 2018, 2019);
- *The 2nd Workshop of International Network for Higher Education in Engineering - INHEE* (2017);
- *PRIA Innovation Conference* (2017, 2018);
- *Open Innovation 2.0 Conference* (2017);
- *Night of Companies - a stop in your career (*2019, 2022);
- *Industry and Technology Fair - IDENTICOM4* (2019);
- *Digital Talks* - organized together with Cluj IT Cluster - matchmaking event between research centers/laboratories/groups from the university and companies members of the cluster (2019);
- *Building Innovation: Financing & Acceleration* - organized together with Cluj IT Cluster - event dedicated to the key concepts of SME Instruments: from basic principles to the evolution to accelerator and blended finance mechanisms (2019);
- Events organized in UTCN for students, by companies: *Summer internship Continental Sibiu, Summer internship Tenaris, RAF workshop dedicated to entrepreneurial education, Build Your Robot - STRATEC Internship 2021 and 2021, Working Student Bosch, Emerson Engineering Bootcamp, Internship Infineon, Midsummer Ruby on Rails internship at Wolfpack Digital, Bosch Mechanical Design Summer School, Workshop IBM,* s.a. (2020); *SNEAK PEEK, Technical webinars organized by TenarisSilcotub for UTCN students, 22.02-18.03.2021; Innovation Labs Hackathon, 6-7.03.2021; ''Romania's Digital Future - Digital Transformation Opportunities" Event, 25.02.2021; Emerson's Engineering Boot Camp 2021; Workshop online Vitesco Technologies Romania 2021; A day at work in Continental Sibiu, 8/9 June 2021; BCR campaign to promote services, dedicated to students, 2021; "Hackathon" - 2022 edition, organized by TechLounge, Transylvania Institute of Technology in partnership with the Romanian-American Foundation as strategic partner;*
- *StartupCity Cluj-Napoca*, with the participation of the European Commissioner for innovation, research, education, culture and youth, Mariya Gabriel (2020).
- Under the umbrella of the "Night of Museums" event, on 14 May 2022, UTCN organized "Tomorrow's Technology in Today's Exhibition" at the Casino Center for Urban Culture, an exhibition that was visited by over 6000 participants.
- On 30 September 2022 the *"European Researchers' Night 2022 - SCIENCE4FUTURE"* took place, an event for pupils and students passionate about science, where UTCN was part of the organizing team.
- From 3 to 17 October 2022, the *"Global Startup Cities eHealth Program 2022"*, as part of the strategic program Global StartupCity Cluj-Napoca, the Education Cluster (C-EDU), together with HIVE Innovation, Linnify and UMF, organized the startup competition on the eHealth component.
- UTCN initiated a *"Social Dialogue Event"* under the umbrella of the POCU project, Advanced Practice for Career Success - ING-neering - PAVING, with the participation of students and representatives from the socio-economic environment.
- Conducting technical and non-technical webinars for students, interactive sessions, workshops or internships: **HCL Romania, Luminos Labs**, **NTT Data**, **Banca Transilvania**, **AROBS Transilvania Software**

(Automotive and Embedded; JavaScript; QA Automation; Cybersecurity; *„Microcontroller Programming #Autosar #CAN”* and *„Instrument Clusters Diagnosis #EmbeddedC #Python”*), **Romanian Commercial Bank, Deloitte** (*„Just do IT with Deloitte ERDC”)*, **Tenaris Silcotub** („Summer internship”; Long-term internship), **Continental Sibiu** („Summer Engineering & Programming Internship*"; "A day at work in Continental Sibiu*" and the *„Industry 4.0”* webinar), **Wolfpack Digital** („Summer Internships: Quality Assurance and Mobile Development*")*, **Qinsoft Solutions, Stratec** (*„Build Your Robot”)*, **Porsche Engineering România** (on the Machine Learning & Digitalization domain)**, Winnow Europe, Q_Perior Romania** (**„***Join our BI Academy”*), **Analog Device** (*„3D Machine Vision”; „Software defined Instrumentation”* and *„Software Defined Radio”*), **Stables Cluj-Napoca** (*„DevHacks”*, a Hackathon with the theme of Smart Office)**, Endava** *(„Career Coaching Sessions”)*, **Holcim Romania** (the Caravan *„Well-Cemented Professions”)*, **Emerson** (*„Engineering Bootcamp” and „Kick Off your Career”)***.**

There was support for programmes and projects that benefit both students and the University, through:

÷ Participation in joint local, regional, national and international development projects by increasing external funding;

÷ Within the framework of the "Entrepreneurial University" programme, the SAS operating structure has been developed to support students in developing entrepreneurial and intrapreneurial approaches to business community and entrepreneurial education and training students for the labor market;

÷ Running the Student Entrepreneurial Society Project - SAS - UTCN Students - Entrepreneurs in the Digital World - FDI CNFIS-FDI-2018-0438;

÷ Running the project CNFIS FDI 615/2022 *UTCN Students - Entrepreneurs in the digiTal World (SALT);*

÷ Supporting UTCN Student Entrepreneurial Society events: Workshops at all UTCN faculties, with participation of experts from the socio-economic environment; students supported and mentored in their business initiatives; Demo Day - for direct connection of students with investors in their business ideas, where business ideas and prototypes were validated in front of a jury of entrepreneurs; SAS steering group training to improve entrepreneurial activity in UTCN and to connect to international entrepreneurship networks; Entrepreneurial University, entrepreneurial education and mentoring actions in partnership and collaboration with Junior Achievements; entrepreneurship mini-challenge for teachers;

÷ The submission of projects for funding under POCU, on the Innotech Student competition (5 projects have been submitted, one with UTCN in charge and four as partners);

÷ Collaboration with the National Union of Romanian Employers (UNPR) with the included objective of modernizing the educational process through the use of modern methods and technologies supported by augmented and virtual reality;

÷ The "Innovation Labs" program in collaboration with RAF (Romanian American Foundation) and Transylvania Institute of Technology Foundation, by facilitating a financial mechanism to grant scholarships to students in order to continue their project within the program, organized in annual editions;

÷ *Discover your passion in IT* – DpIT;

÷ UTCN students who are beneficiaries of scholarships *Roberto Rocca Education Program;*

÷ Nation through education;

÷ BRD First Tech Challenge Romania;

÷ *FUTURE - Build with passion*, a programme that integrates students, companies and teachers in developing skills needed in the workplace. The programme partners were Tenaris Silcotub and Mădălina

Hodorog. The program took place in 2019, 10 unique training sessions were organized through experiential education and benefited 40 students and 10 teachers;

÷ The start of the project *"Company Month"* by conducting technical webinars for students. In November 2020, a series of webinars organized by Continental Sibiu took place, events attended by over 600 students; planning of the project for continuation in 2022 was carried out.

The actions initiated by CRMSE to support the Entrepreneurial University programme (developing collaborative relationships and facilitating the transfer of knowledge to and from socio-economic organizations) are:

- *„Innovation Labs Hackathon"* - 2021 edition, an event organized by TechLounge, Transylvania Institute of Technology in partnership with Orange, Carrefour, BRD, OMV Petrom, ATOS and the Romanian-American Foundation, as strategic partner;
- *„Hackathon"* - 2022 edition, organized by TechLounge, Transylvania Institute of Technology in partnership with the Romanian-American Foundation, as strategic partner;
- Innovation Labs 10th anniversary gala.

- UTCN is part of the Spherik Accelerator Committee
- The *„Blockathon"* is a competition organized by Spherik Accelerator in collaboration with Cluj Startups, powered by B-hub for Europe, where participants organized in teams will propose solutions that can contribute to the digitisation of public sector processes;
- The session of mini grants for entrepreneurship projects carried out in universities, organized by Junior Achievement Romania, the Entrepreneurial University and the Romanian-American Foundation;
- Participation of UTCN together with the Cluj-Napoca City Hall and the other partners of the Education Cluster in the project *"Cluj Innovation and Experiment Fund - FIX Cluj"*, supporting innovation and entrepreneurship ideas;

- The Technical University of Cluj-Napoca is part of the *"Innovative European University of Technology (Inno-EUt+)"* project, an initiative of the European Institute of Innovation and Technology (EIT), which aims to enhance the entrepreneurial and innovation capacity of a new European university alliance, the European University of Technology (EUt+). In 2022 within the European University of Technology/European University of Technology (EUt+) consortium:
    - During the week of 21 - 25 March 2022, UTCN hosted the meeting of the representatives of the 8 partner universities in the European alliance EUt+. It was attended by 100 participants from the member universities of the consortium, together with their rectors and presidents, who focused on work steps in different directions of action, from research, curriculum, mobility, to European institutes and research laboratories. One of the major concerns of EUt+ is the convergence of competences and learning outcomes within the study programmes that are part of the Civil Engineering, Mechanical Engineering, Telecommunications, Architecture and Industrial Engineering clusters, the first to enter the mobility circuit from next academic year;
    - Memoranda of Understanding: UTCN core partners were invited to join the European University of Technology (EUt+) consortium as strategic partners and Memoranda of Understanding were signed with Arobs Transilvania Software, Electrogrup, Emerson and TenarisSilcotub;
    - International internship programmes: GET_INVOLVED Germany FAIR/GSI - internship programme organized in Darmstadt, Germany, member of the EUt+ alliance (https://fair-center.eu/career/get_involved/funding/germany);
    - *3rd Unique Summit*, EUt+ European University of Technology, Braga, Portugal, 27th November - 1st December 2022. „EUt+ Pilot in the Heart of Transylvania" refers to the EUt+ alliance contribution to the Rural-Urban-Hub pilot experiment to test the alliance tools in addressing, dividing and achieving a more inclusive green transition for digital transformation and resilient sustainable development in rural areas. UTCN intends to contribute to the Rural-Urban-Hub with a consistent, real-life tested proposal on how to use education, innovation and startups to achieve EU mission goals;

- Launch of the event *Women in Tech*: a series of events were organized in Cluj-Napoca from 18 to 20 May 2022 under the aegis of StartupCity Cluj-Napoca Days 2022. Thus, during the Innowave Summit 2022, one of the most innovative and important events in the HighTech field in South-East Europe, with Mrs Mariya Gabriel, European Commissioner for Innovation, Research, Culture, Education and Youth, as ambassador, on 20 May 2022, during the session "Women in Tech", the platform for promotion and support for women active in the digital technology sector in Romania was launched.

- The *Innovate* project, which was submitted under the HORIZON-EIC-2022-GENDER-01 call for the development of a pilot Gender and Diversity Innovation Index with a two-year implementation period, received a Letter of Project Support from seven UTCN partner companies;
- UTCN's actions on proposing its own recognised DeepTech competences for the call launched by the European Commission have started.

- *„HealthTech Next Generation”*, organizer being Fresh Blood, a competition aimed at people passionate about innovation and health;
- *„E-Mental Health Hackathon”*, a competition for UTCN students passionate about healthcare, and entrepreneurs interested in healthcare innovation, organized by Wolfpack Digital.

The development of the existing database for the regional eco-system continued: firms, clusters, NGOs, banks, inter-university associations, foundations, development agencies, international networks. The database now includes over 400 partners. The CRMSE database has been used to support:

÷ the international evaluation of the Technical University of Cluj-Napoca by Qs Stars Rating System;
÷ the annual organizing of the Scientific Research, Innovation and Invention Fair - PRO INVENT;
÷ the organizing the first edition of the UTCN Alumni event;
÷ the "I will be an engineer", "UTCN 2020 Engineering Excellence" and "UTCN 2021 Engineering Excellence" projects initiated by UTCN;
÷ UTCN conferences, such as 2019 IEEE 25th International Symposium for Design and Technology.

Joint institutional developments with socio-economic organizations in national/international development projects and internships for students and PhD/Postdocs. Examples of internship and traineeship offers for students communicated on the CRMSE website, https://crmse.utcluj.ro/index.php/anunturi.html:

- The UTCN project in collaboration with Robert Bosch, UTCN partner: Start launched for a successful career (project code: 109041), financed by structural funds on the competition: POCU/90/6.13/6.14 - internships for pupils and students in the agri-food sector, industry and services.
- *"Management of Technical Projects"* - Master's degree in partnership with Emerson at the Faculty of Industrial Engineering, Robotics and Production Management;
- *„The Basics of Quantum Information"* - optional course in partnership with INCDTIM Cluj, at the Faculty of Automation and Computers, 2nd year;
- Continuation of the project in partnership with Robert Bosch - course "Autonomous Driving: Technology, Dynamics and Control", now in its 5th edition;
- Knowledge and technology transfer by equipping laboratories: Bosch Laboratory - Industry 4.0 - Simtex building, B-dul Muncii, Sanitary Engineering Laboratory - in partnership with Grohe - Faculty of Installation Engineering building, B-dul 21 Decembrie 1989, Installation Technology Laboratory - sponsored by RIDGID - Intelligent Lighting - sponsored by Signify - Philips.
- Signing with the socio-economic environment of more than 100 internship partnerships under the **PAVING** project and more than 40 internship partnerships under the **ANTREDOC** project;
- Arranging study visits; proposals of topics for undergraduate work from companies; awards for undergraduate work; lectures by business experts; development of innovative multidisciplinary projects from idea to product through knowledge transfer from business experts to students.

An increased financial dimension has also been achieved through the implementation of projects financed from complementary funds, in partnership with the socio-economic environment, as follows:

- Through POCU, the UTCN project in partnership with Bosch, *"Entrepreneurial skills and research excellence in doctoral and postdoctoral study programmes - **ANTREDOC***"; the UTCN project *"Advanced Practice for Success in ING-neering Careers - **PAVING**"*; the NTT Data project, *"**PEX** - Practicing Practical Excellence"*; the ENDAVA ROMANIA project in partnership with UTCN, *"Practical learning programme for students - **PRACTIC 20-21**"*.
- Through the POC, projects are carried out in partnership with companies, with a research component, through competitions:
  - "Advanced technologies for intelligent urban electric vehicles - **URBIVEL**", total eligible value 15.634.286,75 lei, in partnership with Tehnologistic, Porsche Engineering Romania, ICPE, Belco Avia, NET Brinel, ICPE-IE, Siemens Industry Software, AROBS Transilvania Software, Remarul 16 Februarie, Inovo Finance;

- "Micro-inverters with high power density and high efficiency for renewable energy sources - **MICROINV**", in partnership with Tehnologistic, Napoca Software, BKD Electronic, Datronix Computer, Hyalcor;
- *Innovative Technology Project,* developed in partnership with the Taparo company.
- "Partnerships for knowledge and technology transfer for the development of specialized integrated circuits to increase the energy efficiency of new generations of vehicles - PartenerIC", in partnership with Infineon Technologies Romania;
- „Integrated Development 4.0", in partnership with Infineon Technologies Romania;
- "Creation of a center of excellence in composite materials", in partnership with TAPARO;
- "Forestry funicular with hybrid drive and energy recovery", in partnership with IIRUM;
- "Innovative technology models for the design and use of database applications that will ensure complete separation of the logical data model from implementation details and run on multiple platforms, including running in the cloud", in partnership with CRISOFT;
- "Computational models based on big data and predictive data analytics for optimizing and automating the distribution of insurance products through the 24Broker.ro platform", in partnership with LIFE IS HARD;
- "Development by Arobs of a new system for testing central control units for vehicles", in partnership with Arobs Transilvania Software;
- "GREENTOP - Agro-Biodiversity", in partnership with Indeco Soft.

Through its entire collaboration with the socio-economic environment, the Technical University of Cluj-Napoca is an effective agent of economic growth and social welfare in the region, an active member of regional initiatives aimed at economic and social development in this ecosystem, contributing to their development through direct knowledge transfer, academic excellence correlated with the needs of the socio-economic environment, research, as well as entrepreneurial and investment activities.

1.2. The field of doctoral studies in chemistry

1.2.1 Establishment

The new field of PhD studies in chemistry is established within the UTCN Doctoral School. The Doctoral School of the Technical University of Cluj-Napoca (SD-UTCN) is today the only structure of its kind in the Technical University of Cluj-Napoca (UTCN) that is an Organizing Institution for Doctoral Studies (IOSUD). UTCN has a rich tradition of technical education and represents, at the same time, a focal point of future development in the region. The realization of the united Romanian national state on 1 December 1918 opened up new perspectives for education at all levels. On 1 February 1920, the Higher Industrial School was founded, and the new school underwent a series of reorganizations before becoming the School of Technical Conductors in 1922. It was at that time the only school of this level in the country, with an electromechanical profile, and it is the precursor of the Faculty of Electrical Engineering of UTCN.

Another technical school created in 1920 was the School of Public Works Supervisors, with a focus on roads and bridges, which was the precursor of the UTCN Faculty of Construction. The School of Technical Conductors, which enjoyed an important prestige within the Romanian industry, was reorganized in 1937 as the School of Electromechanical Sub-Engineers. Following a memorandum addressed to the Ministry of Education concerning the establishment of a Polytechnic in Cluj with three faculties: Construction, Electromechanics and Forestry, the provisions of the Education Reform Law of August 1948 created the Institute of Mechanics in Cluj (see OM 263327), having a faculty with two departments: Thermotechnics and Machine Tools. The growing need for technical staff led to the Institute of Mechanics becoming the

Polytechnic Institute of Cluj in 1953.

In 1992, the Polytechnic Institute changed its name to the one it still bears today, Technical University of Cluj-Napoca (UTCN) - see HG 812. From the three faculties existing at that time (1992), seven faculties were created through restructuring, as well as the University Technical, Economic and Administrative College. In 1998, the structure of the Technical University of Cluj-Napoca was completed with the Faculty of Architecture and Urbanism, and in 2007, with the Faculty of Installations. In 2012, the Technical University of Cluj-Napoca merged with the Northern University of Baia Mare which became the Northern University Centre of Baia Mare (see HG 84).

The founding documents of UTCN are:

- Decision of the Public Ministry no. 263327 published in the Official Gazette of 26 October 1948 on the organization of higher education - see OM 263327;
- Romanian Government Decision no. 812 of 28 December 1992 on the organization and functioning of the Ministry of Education published in the Official Gazette No 337 of 29 December 1992 - see HG 812;
- Ministerial Order no. 5262 of 5 September 2011 published in the Official Gazette No 637 of 6 September 2011 on the establishment of the results of the classification of universities - see OM 5262;
- The merger by absorption contract between the Technical University of Cluj-Napoca and the Northern University of Baia Mare accompanied by Government Decision No 84 of 14 February 2012 amending Annex no. 3 to Government Decision No 536/2011 on the organization and functioning of the Ministry of Education, Research, Youth and Sport, and amending Annex No 2 to Government Decision no. 966/2011 for the approval of the Nomenclature of fields and specializations/programmes of university studies, the structure of higher education institutions, the fields and programmes of university studies accredited or authorized to operate provisionally, the geographical locations, the number of transferable study credits for each programme of university studies, form of education or language of instruction, as well as the maximum number of students who may be enrolled published in the Official Gazette no. 122 of 20 February 2012 - see HG 84;
- UTCN Senate Decision no. 323 of 07.11.2014 on the list of doctoral schools to operate within IOSUD-UTCN- (HS 323);
- UTCN Senate Decision no. 856 / 15.12.2017 on the reorganization of the doctoral schools of the Technical University of Cluj-Napoca into a single Doctoral School of the Technical University of Cluj-Napoca and the establishment of coordinating councils of doctoral programs (HS 856).

It can be said that the PhD in chemistry has a precedent in UTCN. Thus, between 1990 and 1993, Prof. Gavril NIAC (male; born in Dragomirești, Maramureș on 24 December 1928[0F], died in Cluj-Napoca on 1 December 2010[1F]) was a PhD supervisor in Chemistry at the Polytechnic Institute (until 1992) and later at UTCN (until 1993), a proof of which is the record at the National Library of Romania which records the defense of a PhD thesis under his supervision (Fig. 16).


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Fig. 16. PhD thesis defended in chemistry at UTCN in 1997

Prof. Gavril Niac received his PhD in chemistry in 1963 and acquired his PhD in chemistry in 1973, when he was working at the University of Craiova, and has had over 100 PhD students under his supervision since then. In 1977, he transferred from the University of Craiova to the Polytechnic Institute (at that time) where he became a consultant professor in 1994.

Currently, UTCN, through the Faculty of Sciences and the Department of Chemistry-Biology, coordinates an undergraduate program in Chemistry (Plan Licență) and a master program (Plan Master), both accredited (see HG 367 for bachelor 2023 and HG 356 for master 2023).

The establishment of the new PhD field of study CHEMISTRY at the Technical University of Cluj-Napoca meets the request of the master students of the Didactic Chemistry programme (from 2023-2024 onwards, it will become Fundamental chemistry for teaching), to complete their studies by PhD in Chemistry.

The establishment of the PhD field of Chemistry within the ȘD-UTCN was approved in:

÷ CA through HCA 175-8 of 13 June 2023 (HCA 175-8);
÷ Senate through HS 1647 of 22 June 2023 (HS 1647).

1.2.2 Objectives

The PhD aims to enhance the quality of academic training in conjunction with the institutional mission specified in the Charter (HS 1326), but also the creation of a conducive academic environment in which doctoral supervisors and doctoral students are professionally dedicated and the evaluation criteria are scientific and ethical probity, originality and the scientific value of the research carried out during their studies and thesis.

Doctoral studies in chemistry at IOSUD-UTCN are to be carried out under the aegis of ȘD-UTCN, on the one hand benefiting from its infrastructure and resources and on the other contributing to them. The institutional framework of IOSUD-UTCN is established by the Institutional Regulation on PhD approved by the UTCN Senate (HS 1235), while the activities carried out within the Doctoral School are regulated in the Doctoral School Regulations approved by the CSUD and the Administrative Council of UTCN (HCA 68-5).

1.2.3 Mission

The mission of doctoral studies in chemistry is to:

÷ contribute to the formation of highly qualified, competent human capital capable of integration into the labor market;
÷ ensure the development of knowledge in the field;
÷ contribute to strengthening the field's position in academia and society;
÷ carry out the transfer of research and innovation to the socio-economic environment.

The PhD in Chemistry has the mission to provide graduates with the theoretical and practical knowledge necessary for advanced scientific research, with an emphasis on the development of interdisciplinary skills, appropriate to a technical environment and with a profound entrepreneurial character that UTCN develops through the multitude of bachelor, master and doctoral specializations carried out.

The objectives of the PhD in chemistry derive from its research character:

÷ Achieving a high level of training in the field, competitive with other similar studies and at the level of training required by the labor market;
÷ Promoting original multidisciplinary and interdisciplinary scientific research;
÷ Increasing the international visibility of institutional and national research in the field and the prestige of UTCN;
÷ Increasing visibility in the professional environment; attracting economic agents in partnerships; integrating the technical education of Cluj in the field into the European university area;
÷ Creating opportunities for collaboration on niche and cutting-edge research segments by encouraging training and research internships at prestigious universities;
÷ Raising UTCN's prestige in the Romanian and international academic environment.

In addition to the employment opportunities offered by the completion of bachelor's and master's programmes in chemistry (according to RNCIS) the PhD is intended to deepen and broaden these skills and related topics (Tab. 6).

Tab. 6. titles, qualifications and occupation codes related to the doctoral field chemistry

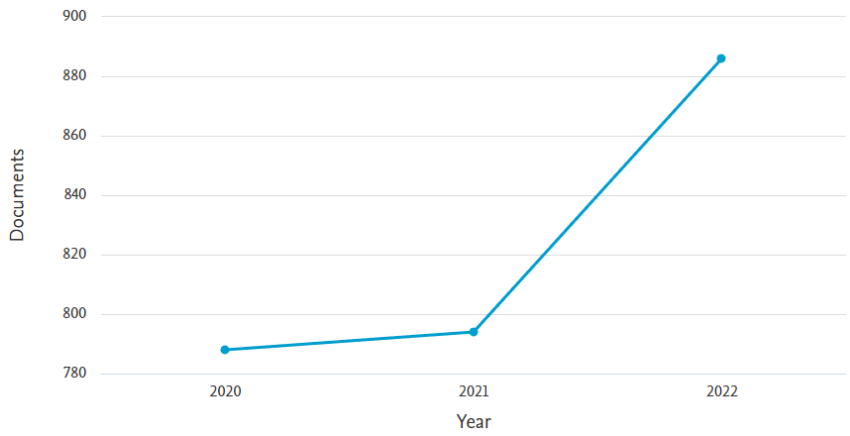
Title	Qualification (occupation code)
Chemistry of biologically active compounds	specialist in applied chemistry (2113.1)
Chemistry of advanced materials	chemical expert (211303)
Chemistry of drugs and cosmetics	specialist in applied chemistry (2113.1.2)
Environmental chemistry and food safety	Specialist chemical inspector (211304)
Chemistry of cosmetics and pharmaceuticals	research assistant in technological biochemistry
Chemistry and Medicinal Chemistry	(211309)
Advanced Chemistry	chemist (211301)
Clinical Chemistry	research assistant in chemistry (211307)
Forensic chemistry	analytical chemist (2113.1.1)
Pharmaceutical chemistry	pharmaceutical chemist (2113)
Chemist Technologist	research assistant in technological biochemistry
Physico-chemical methods of analysis for quality	(211309)
of life and environmental control	research assistant in physical chemistry (211311)
Molecular modeling in chemistry and	chemical advisor (211302)
biochemistry	teacher in vocational and masters education (232001)
Advanced studies in chemistry	teacher in high school and college (233001)
Modern synthesis techniques in chemistry	researcher (214533)
Teacher in pre-university and university	university assistant (231001)
education	university lecturer (231003)

The PhD in Chemistry is the third level of chemistry studies offered in UTCN, after the undergraduate studies in chemistry (with specializations "Chemistry" and "Medicinal Chemistry", see HG 367 Annex 2) and Master's courses (specializing in "Fundamental Chemistry for Education", see HG 356 Annex 1), but the right to participate in the admission procedure for the PhD in chemistry is not restricted to them alone. According to the Code of Doctoral Studies (see HG 681) only graduates with a master's degree or its equivalent, from the country and from abroad, are entitled to participate in the admission procedure for doctoral studies, regardless of the field of their bachelor's or master's studies. From this point of view, the PhD in Chemistry is open to all candidates who meet these conditions from home and abroad, but wishes to offer the

community of graduates of bachelor's and master's studies in UTCN this alternative study, and primarily those already specialized in the line of bachelor's and master's studies in chemistry.

According to the Rector's Report for year 2021 (HS 1478 from 2022) 910 teachers and 5 researchers carry out advanced education and research in UTCN with the support of 758 auxiliary and non-teaching staff. According to the same source HS 1478, at UTCN, 18640 students study at the first 2 cycles of studies (bachelor and master). In addition, there are more than 600 PhD students (625 in the academic year 2021/2022), more than 200 new PhD students are admitted annually (214 in the academic year 2021/2022) and about 100 PhD theses are defended annually (78 in the academic year 2021/2022). According to the following Rector's Report for the year 2022 (HS 1621 from 2023) in UTCN a total of 905 teaching staff, 5 researchers and 773 auxiliary and non-teaching staff carry out advanced education and research. According to the same source HS 1621, 18044 students study at UTCN in the first 2 cycles of studies (bachelor and master). In addition, there are more than 600 PhD students (619 in the academic year 2022/2023), more than 200 new PhD students are admitted annually (213 in the academic year 2022/2023) and about 100 PhD theses are defended annually (56 in the academic year 2022/2023).

The university's educational offer includes over 150 bachelor and master programs - 88 bachelor programs in HG 367 Annex 2 and 87 master programmes according to HG 356 Annex 1, of which 28 professional masters and 41 research masters, 14 doctoral fields accredited according to OM 5500, one PhD in the process of accreditation (Food Engineering) and one PhD proposed for accreditation (Chemistry). In addition to these, there are continuing education programmes, psycho-pedagogical training and postgraduate academic studies. The mission stated in the UTCN Charter (HS 1326), in the vision for sustainable development 2022-2030 (HS 1551) and digitisation 2022-2030 (HS 1493) is guiding the university towards an approach that combines a concern for excellence with providing the widest possible range of education and holding members of the academic community accountable for their contribution to the institution's progress. The € of the UTCN 2020-2024 strategy is *The future is in the eye of the beholder* - see HS 1253 - and quality is one of the priorities on which the university's development strategy is structured. Doctoral studies represent the third cycle of university studies and allow the acquisition of a level 8 qualification in the EQF/CEC and the National Qualifications Framework, obtaining the title of doctor according to the Code of Doctoral Studies. The doctoral degree programs organized within the UTCN Doctoral School are of the scientific doctorate type, which aims to produce original scientific knowledge with international relevance. The UTCN strategic plan includes a concern for increasing the quality of doctoral studies, followed by the need to develop an appropriate management system. The areas and directions of intervention are strengthening and developing excellence in scientific research and innovation, strengthening and developing relations with the socio-economic environment, strengthening and developing international academic relations, developing and supporting human resources, and modernizing and developing the university's infrastructure. Using data from the Rector's Report for the years 2019 (HS 1162 from 2020) , 2020 (HS 1343 from 2021), 2021 (HS 1478 from 2022) and 2022 (HS 1621 from 2023), it is noted that the number of students admitted to doctoral studies has remained approximately constant over the last 4 years with a slight downward trend (222 - 219 - 214 - 214 in 2018/2019, 2019/2020, 2020/2021 and in 2021/2022 respectively). On the other hand, following the research activity, the revenues attracted and collected from various competitions have also experienced an insignificant fluctuation (32, 37, 31, 34 Mil. RON in 2018, 2019, 2020 and 2021). It is very important to note that a large number of projects have been won in international competitions, in prestigious partnerships, producing valuable scientific results, placing UTCN on the 2nd place in the country in relation to revenues attracted through H2020 projects until February 2022 (HS 1162, HS 1343 and HS 1478). The impact of UTCN as measured by the number of articles published is increasing over the last 3 years(Fig. 17).



AFFIL ("Technical University of Cluj-Napoca") AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020))

Fig. 17. Number of documents with authors from UTCN indexed in Scopus

At present, UTCN trains specialists through bachelor, master, doctoral and postgraduate studies, the number of students being around 20 thousand. High-performance scientific research is a key concern of teachers and researchers. UTCN has been a member of the European University Association (EUA) since 2003 and of the Agence Universitaire de la Francophonie (AUF) since 2007. UTCN is also a member of the Alliance of Universities for Democracy, the Black Sea Universities Network, The Silk-Road Universities Network (SUN) and the Danube Rectors' Conference (DRC). Since 2021, UTCN is also a member of the EUA Council for Doctoral Education (EUA-CDE).

Since 2019 UTCN is a founding member of the European University of Technology - Eut+[2F]. It should be stressed that European universities according to the model adopted by UTCN are transnational alliances that will become the universities of the future, promoting European values and identity and revolutionizing the quality and competitiveness of European higher education. The Eut+ project runs from 2020-2023.

The results obtained in teaching, research, university management and international cooperation have been appreciated by the Romanian Agency for Quality Assurance in Higher Education (ARACIS), which, following evaluations in 2007, 2013, 2018, awarded UTCN the rating "High degree of confidence".[1].

Technical University of Cluj-Napoca is a modern higher education institution, being "University of Advanced Research and Education", among the first twelve universities of this kind in the country, according to OM 5262. UTCN participated in the international QS Stars assessment in 2019, achieving 4 stars (out of 5 possible) equating to an internationally recognised university of excellence.

The mission of doctoral studies in chemistry is to support this good ranking.

1.2.4 Curriculum

The entire doctoral programme in the field shall take place over three years (six semesters) and comprises two stages: the Advanced Graduate Programme and the Scientific Research Programme. The curriculum has been drawn up in accordance with the requirements of the Institutional Regulations (HS 1235).

Within the framework of the Advanced Graduate Studies Programme, the doctoral student participates in the first semester of the doctoral studies for a period of 14 weeks in activities within the disciplines offered by the doctoral studies when he/she is required to accumulate 30 credits (art. 34-1 in HS 1235). For each subject in the advanced degree-based training programme, the doctoral candidate receives a certificate of participation, issued by the course holder and countersigned by the (principal) supervisor. All certificates of participation are submitted by the doctoral student to the IOSUD-UTCN secretariat, which verifies the fulfillment of the obligations of the training programme based on advanced university studies

(art. 48-1 in HS 1235). The subjects included in the advanced university-based training programme have analytical programmes (in the subject sheets) in which are specified: the name of the subject, the number of credits allocated, the distribution of hours for the course, seminar, laboratory and project, the objectives, the concordance between the objectives of the subject and the objectives of the qualification, the general competences acquired after completing the subject, the subject matter of the course and the practical activities, the bibliography and the assessment methods, and the hours of individual study are specified in the table in PPUA Chimie containing the Distribution of the time fund for the subjects of the Advanced Degree Based Training Programme.

In the Individual scientific research programme, the curriculum provides for 6 oral presentations (one each semester) in front of the PhD supervisor and the supervision committee as follows (art. 34-2, 52-1, 52-2 in HS 1235): a scientific research project (year I, sem. I, 6 credits), 1 progress report in year I (sem. II), two progress reports in year II (sem. I and sem. II), one progress report in year III (sem. I), each with 30 transferable credits (which can be obtained by supporting these projects also at other institutions such as when traveling to carry out research activities in other universities abroad). The scientific research project (sem. I, year I) is established by the doctoral candidate together with the supervisor and must include the general objective and specific objectives of the doctoral thesis, research methodology, risk assessment and alternative solutions, estimated timetable of research activities - art. 50-1 and 50-2 in HS 1235. When scientific research projects are defended, a report is drawn up in which the main observations and recommendations made by the doctoral supervisor and the members of the supervisory committee are recorded and the grade, which can be either Pass or Fail. In the case of a Rejected mark, the project is reworked. A copy of the minutes, signed by the doctoral supervisor and the members of the tutoring committee who were present, is then submitted to the IOSUD-UTCN secretary's office (art. 52-3 in HS 1235).

The doctoral preparation is completed in semester 6 (semester 2 of the third year) with the defense of the doctoral thesis in front of the supervising committee followed by the public defense of the doctoral thesis.(art. 52-4 in HS 1235). According to HS 1235, The CSUD and the Council of the Doctoral School establish and update the standards for the elaboration and evaluation criteria of doctoral theses. The format of doctoral theses and recommendations on their structure and content are contained in the guidelines for the preparation of doctoral theses drawn up by the CSUD in accordance with the regulations in force. (Std1 Teză). The doctoral student has the obligation to respect the standard format of the doctoral thesis within IOSUD-UTCN (art. 55-1, 55-2 and 55-3 in HS 1235).

The activities of the doctoral programme ensure the acquisition of professional skills (PPUA Chimie) and in accordance with the provisions of Regulation(sec. 4-1 in HS 1235):

÷ Deepening of acquired specialist knowledge and its use in research, development, design of new techniques, technologies, products and equipment (professional competence);
÷ Using acquired knowledge to explain and interpret the phenomena involved (professional competence);
÷ Training the ability to identify, formulate and solve research problems (professional competence);
÷ Develop the ability to document, elaborate and capitalize on scientific works (professional competence);
÷ Understanding the principles and values of scientific research ethics (professional competence);
÷ Carrying out activities according to explicit requirements and specifications on time following a pre-established work plan under qualified guidance (transversal competence);
÷ Solving problems in line with the general objectives set by integrating into a working group and distributing tasks to subordinate levels (transversal competence);
÷ Development of written and oral communication skills (transversal competence);
÷ Improving skills in the use of information and communication technology (transversal competence);

÷ Refining academic language skills in international languages needed to document and write scientific papers (transversal competence);
÷ Establishing knowledge of risk management in research, knowledge of the use of intellectual property rights legislation and economic, technological and social entrepreneurship (transversal competence).

The subjects of the advanced degree-based training program related to the field are taught "by teachers or researchers who are doctoral/doctoral supervisors, professors/CS I or university lecturers/CS II with proven expertise in the field of the subjects taught or other specialists in the field who meet the standards set by the institution for the above-mentioned teaching and research positions, in accordance with the law". The curriculum of doctoral studies in chemistry covers these disciplines. In Tab. 7 shows these disciplines:

Tab. 7. Subjects of the advanced training programme in the doctoral field of chemistry

Subject	Form	Number of hours (C+S+L+P)	Number of credits	Subject sheet
Ethics and academic integrity	Obl.	1 (1+0+0+0)	3	FD D16-1
Statistical processing of experimental data	Obl.	2 (1+1+0+0)	5	FD D16-2
Research activity	Obl.	6 (0+0+0+6)	6	FD D16-3
Electrochemical analysis methods	Opt.	4 (2+0+2+0)	8	FD D16-4
Analysis by atomic and molecular spectrometry	Opt.	4 (2+0+2+0)	8	FD D16-5
Technological properties of materials	Opt.	4 (2+0+2+0)	8	FD D16-6

The disciplines are detailed in PPUA Chimie.

In their advanced training programme, doctoral students must follow the three compulsory subjects and must opt for two optional subjects to obtain the total number of 30 credits. At the same time, on the basis of the transferable credit system doctoral students can follow corresponding subjects from the curricula of other doctoral schools and from Master programmes. In the latter case the approval of the substitution of these subjects in the advanced training plan is made with the approval of the coordinating council of the field.

For the disciplines listed in Tab. 7 these are taught by specialist staff with a teaching grade of at least lecturer, as shown in the attached subject sheets, as follows: Subject 1, Conf. dr. engr. Giurgiulescu Liviu-Laurențiu; Subject 2, Conf. dr. engr. Leonard Mihaly Cozmuța, Subject 3, Doctoral supervisor (of which there are two lecturers) - Conf. dr. Thomas P. Dippong and Conf. dr. Simona Rada, and one with the rank of professor - Prof. L. Jäntschi); Subject 4, Conf. dr. engr. Leonard Mihaly Cozmuța; Subject 5, Conf. dr. engr. Leonard Mihaly Cozmuța; Subject 6, Conf. dr. engr. Mariana Pop.

1.2.5 Doctoral supervisors

The teaching staff serving the PhD in chemistry carry out their scientific research activity within UTCN in accordance with their own scientific research strategy which is included in the scientific research strategy of the parent faculty and that of the Technical University of Cluj-Napoca. The strategy of the Technical University is defined in its strategic development plan (see Development Plan of the Technical University of Cluj-Napoca for the period 2020-2024, HS 1253). The scientific research strategy of the department is an integral part of the faculty's research plan, it includes the main research directions resulting from the analysis of the current state of research trends and the proposals put forward by each research team within the department.

The PhD in chemistry is organized on the basis of a scientific research plan approved by the IOSUD-UTCN management, included in the strategic plan of the faculty and the university, in accordance with the UTCN long-term research strategy approved by the UTCN Senate. The PhD-serving faculty in chemistry

addresses research topics within the subject areas covered by the programme curriculum. They fall within the scientific area of the PhD field and the disciplines taught in this PhD programme.

The doctoral supervisors who have come together to form the faculty of the field of chemistry are listed in the following table (Tab. 8).

Tab. 8. Tenured teachers in the IOSUD-UTCN with a degree in chemistry

Name and surname	Title	Faculty	Department	Tenured	SD-UTCN Affiliation	Abilitation
Jäntschi Lorentz	Prof.	Materials and Environmental Engineering	Physics and chemistry	Sheet J0	HS 1654	OM 3570MD
Rada Simona	Conf.	Materials and Environmental Engineering	Physics and chemistry	Sheet R0	HS 1652	OM 5633MD
Dippong Thomas	Conf.	Sciences	Chemistry and biology	Sheet D0	HS 1653	OM 4193

1.2.6. Studenții

UTCN has a defined calendar (HCA 165-16) and a transparent and rigorous student recruitment and admissions strategy, respecting the principle of equal opportunities for all applicants without any discrimination. In accordance with the Regulation on the organization of admission to the cycle of doctoral studies at the Technical University of Cluj-Napoca (HS 1467 art. 9); the admission session periods, the application documents and the competition tests shall be made public at least 6 months before the admission competition, by publication on the IOSUD-UTCN's own website in both Romanian and English. For details: http://iosud.utcluj.ro/admitere.html and http://iosud.utcluj.ro/admitere.en.html.

Graduates of master's degree courses, as well as graduates with a bachelor's degree or equivalent, issued up to the year of graduation of the first undergraduate class organized in accordance with the provisions of Law no. 288/2004 on the organization of university studies, as amended and supplemented (long-term education), may apply for a doctorate (HS 1467 art.20).

Admission to doctoral studies consists of at least two examinations held in front of an admission committee made up of the doctoral supervisor who offered the student-doctoral place for admission and at least two other specialists from the Technical University of Cluj-Napoca who hold at least the position of university lecturer or scientific researcher grade II. The chair of the admission committee is the PhD supervisor. One test consists of a language proficiency exam for an international language held in the Department of Modern Languages and Communication of UTCN. The admissions committees are proposed by the Doctoral Program Coordinating Councils and the Doctoral School Council and approved by the CSUD Director. The second test is the interview in which the level of training and scientific/professional concerns of the candidate, his/her research skills and the proposed topic for the PhD thesis are analyzed. Depending on the specificities of the field, other tests may be foreseen in the PhD admission competition, at the request of the PhD supervisors and with the agreement of the Council of the Doctoral School. (HS 1235 art.29(1-5)).

1.2.7 Research activity

The teaching staff serving the PhD programme in chemistry carry out their scientific research in the Department of Physics and Chemistry and in the Department of Chemistry and Biology in accordance with their own Scientific Research Strategy (Dissem Plan) which is included in the Scientific Research Strategy of the Faculty of Materials and Environmental Engineering, the Faculty of Sciences and the Technical University of Cluj-Napoca. The Scientific Research Strategy of the Departments, an integral part of the Research Plan of the faculties, includes the main research directions resulting from the analysis of the current state of research trends and the proposals put forward by each research team within the departments. The PhD programme

in Chemistry will have its own scientific research plan, approved by the IOSUD-UTCN management, which will be included in the Faculty's strategic plan IMM, in line with the long-term research strategy approved by the UTCN Senate. The academic staff serving the PhD programme in Chemistry will address research topics within the subject areas covered by the programme curriculum. They will fall within the scientific area of the doctoral field and the disciplines taught in this doctoral programme. The scientific research will be carried out on own equipment in the department's research centers and laboratories (Sheet Spaces and Equipments). Their equipment has been provided both from university funds and from research contracts coordinated by the departments' teaching staff and includes a range of equipment purchased over the last 5 years (Sheet e5ani), calculation programs (Sheet Soft) contained within internally accredited laboratories (Groups Sheet) and promoted on the ERRIS platform (Sheet ERRIS). Research internships to be carried out at foreign universities with which the teaching staff have collaboration protocols or ERASMUS and CEEPUS projects (Italy, Poland, Netherlands, Brazil, Norway, Czech Republic, France, Portugal, etc.) will allow PhD students access to analytical equipment that does not exist in the department's laboratories. (AM Sheet). The teaching staff serving the PhD program in the field of Chemistry capitalize on their scientific research activity through publications in specialized journals and recognized publishers in the country and abroad, and through scientific communications presented at sessions, symposia, seminars in the country and abroad, and contracts with partners in the country or abroad, as shown in the attached CVs: CV_Dipp, CV_Jaen, CV_Rada.

The IMM Faculty and the Faculty of Sciences regularly organize scientific sessions, symposia, conferences, round tables with teachers, researchers and graduates, and the communications are published in scientific bulletins with ISBN and/or ISSN. The Department of Chemistry and Biology organizes annually, the Session of scientific communications of students (Dissem Plan). Specifically the Department of Chemistry and Biology organizes the competition "Chemistry of Drag", the intercounty competition of Biology, Chemistry and Food Industry, monthly scientific seminars, student scientific sessions, the student symposium "History of Chemistry", and the symposium "Modern teaching strategies" (Dissem Plan). Relevant link: http://chimie-biologie.ubm.ro/evenimente.html

Doctoral students will participate in the scientific seminars of the Department of Chemistry-Biology when topics relevant to their scientific research are under discussion.

1.2.8 Research centers/laboratories

The teaching staff involved in the activity of PhD supervision in chemistry is involved in research structures at IOSUD-UTCN level (see Sheet Grupuri). In Tab. 9, their respective affiliations are shown.

Tab. 9. Apartenența la structuri de cercetare acreditate intern

Indicator	Quality	Structure
L. Jäntschi	Member	Instrumental Analysis (laboratory)
	Director	Electrochemistry Laboratory for Advanced Materials
S. Rada	Member	Research Center for Physics and Chemistry of Advanced Materials and Environment
T. Dippong	Director	Nanomaterials and Applications to Environmental and Food Analysis

Internally accredited research structures are also promoted on the ERRIS platform (). As is evident from the promotion on the ERRIS platform (ERRIS Sheet), a range of equipment (Spaces and equipments Sheet; Sheet e5ani) and computing technology (Calc Sheet; Soft Sheet) for research are directly accessible in the research laboratories of the chemistry faculty, while other equipment is available on the basis of their collaborative relationships.

1.2.9 Main scientific achievements

The main scientific achievements of the teaching staff involved in the activity of PhD supervision in chemistry is summarized in Tab. 10.

Tab. 10. Achievements of relevant significance, with contributions at international level, that show progress in research

Specialist	Contribution
Prof. Lorentz Jäntschi (male)	Sheet JC1 M.V. Diudea, I. Gutman, L. Jäntschi. Molecular Topology, Hutington, NY, USA: Nova Science, **2001**, 332 p. The book is co-authored with authors with major impact in the field (I. Gutman - President International Academy of Mathematical Chemistry, M.V. Diudea - President of the European Society of Mathematical Chemistry), and is still today a reference work in the field. It has almost 500 citations in WOS (and in Google)
	Sheet JC2 L. Jäntschi, Integrated Structural Investigations on Biologically Active Compounds, ET/36/MEC/UEFISCSU/3150/11.10.**2005**, 90.33/100 pt., 42 K$. In summary, during the research project and after its completion, more than 50 molecular sets with biological activity were investigated using the methodology created within the project, "MDF-SARs" available online (http://l.academicdirect.org/Chemistry/SARs/MDF_SARs/). Almost 50 scientific papers have been published as a product of the research, most of them with high international visibility.
	Sheet JC3 S.D. Bolboacă, L. Jäntschi. Pearson versus Spearman, Kendall's Tau correlation analysis on structure-activity relationships of biologic active compounds, Leonardo J. Sci. 5(9): 179-200, **2006.** The paper proves the importance of semi-quantitative coefficients for correlation analysis in classes of biologically active compounds and is still today a reference work in the field. It has over 400 citations in Google.
	Sheet JC4 S.D. Bolboacă, L. Jäntschi. Modelling the property of compounds from structure: statistical methods for models validation. Env. Chem. Lett. 6(3): 175 - 181, **2008**. The paper proves the importance of 3 statistical experiments (Leave-one-€ analysis, € versus test analysis, Correlated correlation analysis) for regression analysis in classes of biologically active compounds. IF2021 (Env. Chem. Lett.) = 13,615; it has 26 citations in WOS and 42 citations in Google.
	Sheet JC5 L. Jäntschi. Structure-property relationships for solubility of monosaccharides. Appl. Water Sci. 9(2): 38 - 11p, **2019**. The paper proves the importance of distribution analysis for association analysis in classes of biologically active compounds. IF_{2021}(Appl. Water Sci.) = 5.411; it has 10 citations.
	Sheet JC6 L. Jäntschi. The eigenproblem translated for alignment of molecules. Symmetry 11(8): 1027 - 8p.+4p., **2019**. The communication shows an intrinsic link between molecular alignment and the eigenvalue and eigenvector method. It has 35 citations.
	Sheet JC7 L. Jäntschi. A test detecting the outliers for continuous distributions based on the cumulative distribution function of the data being tested. Symmetry 11(6): 835 - 15p.+7p., **2019**. The paper establishes a new test for the membership of a data series to a distribution. It has 36 citations.
Conf. Simona Rada (female)	Sheet RC1 Rada, S; Culea, M; Neumann, M; Culea, E. Structural role of europium ions in lead-borate glasses inferred from spectroscopic and DFT studies, Chem. Phys. Lett. 460 (1-3) , 196-199, € 20 **2008**. The paper carried out in collaboration with a researcher from a prestigious university revealed important structural changes of continuous transition between 2 states occurring in europium oxides in samples prepared by the 'melt quenching' method. It has 91 citations in WOS
	Sheet RC2 Rada, S; Pascuta, P; Culea, M.; Mățieș, V.; Rada, M.; Bârlea, M.; Culea, E. The local structure of europium-lead-borate glass ceramics [29th European Congress on Molecular Spectroscopy], J. Mol. Struct. 924, 89-92, Apr 30 **2009**. The paper, which has passed through two review committees (at the European Molecular Spectroscopy Congress and the Journal of Molecular Structure) presents experimental evidence supported by theoretical modeling on the influence of europium ions on the structural behavior of lead-borate glass ceramics. It has 63 citations in WOS

Specialist	Contribution
	Sheet RC3 Rada, S; Pascuta, P; Boșca, M; Culea, M; Pop, L; Culea, E. Structural properties of the boro-bismuthate glasses containing gadolinium ions. Vib. Spectrosc. 48, 255-258, November 20, **2008**. The paper, passed by two review committees (at the International Conference on Advanced Vibration Spectrometry and the journal Vibrational Spectroscopy) presents experimental evidence supported by theoretical modeling that the glassy lattice becomes tighter with increasing gadolinium ion content in a glassy system containing gadolinium ions. Has 49 citations in WOS.
	Sheet RC4 Rada, S; Culea, M; Culea, E. Toward Modeling Phosphate Tellurate Glasses: The Devitrification and Addition of Gadolinium Ions Behavior, J. Phys. Chem. A 112 (44) , 11251-11255, Nov 6 **2008**. The paper, published by the most prestigious publishing house and professional association in the field of chemistry communicates the authors' results obtained from the study of bottles in the $x Gd_2O_3 \cdot (100 - x)[7TeO_2 \cdot 3P_2O_5]$ system with $0 \le x \le 20$ $\%_{mol}$ when it was shown that the addition of gadolinium ions to the host glass matrix leads to an increase in the polymerization of the glass lattice due to the replacement of P-O-P bonds with stronger P-O-Te bonds resulting in improved chemical durability of the glass. It has 48 citations in WOS.
	Sheet RC5 Rada, S; Culea, E. FTIR spectroscopic and DFT theoretical study on structure of europium-phosphate-tellurate glasses and glass ceramics, J. Mol. Struct. 929 (1-3), 141-148, € 16 **2009**. The paper communicates the authors' results obtained from the study of bottles in the $x Eu_2O_3 \cdot (100 - x)[7TeO_2 \cdot 3P_2O_5]$cu $0 \le x \le 60$ $\%_{mol}$ system when it was shown that the addition of a high content of Eu2O3 causes the gradual depolymerization of the phosphate chains and the formation of a crystalline phase of $EuPO_4$.
Conf. Thomas Dippong (male)	Sheet DC1 Dippong, T.; Levei, E. A.; Cadar, O. Recent Advances in Synthesis and Applications of Mfe_2O_4 (M = Co, Cu, Mn, Ni, Zn) Nanoparticles. Nanomaterials 11, 6, 1560, **2021**. The review summarizes research on the synthesis and characterization of nanosized ferrites over the past decade. Particular attention has also been paid to identifying new applications for these materials. IF_{2021}(Nanomaterials) = 5.719. It has 80 citations in WOS and it is 🏆 WOS Highly Cited Paper.
	Sheet DC2 Influence of Cu^{2+}, Ni^{2+}, and Zn^{2+} Ions Doping on the Structure, Morphology, and Magnetic Properties of Dippong, T.; Levei, E.A.; Deac, I.G.; Neag, E.; Cadar, O. Co-Ferrite Embedded in SiO_2 Matrix Obtained by an Innovative Sol-Gel Route, Nanomaterials 10, 3, 580, **2020**. This paper presents the synthesis of metal doped Co ferrites, $M_{0.2}Co_{0.8}Fe_2O_4$ (M = Cu^{2+}, Ni^{2+} and Zn^{2+}) embedded in the SiO_2 through an innovative sol-gel route. IF_{2021}(Nanomaterials) = 5.719. It has 46 citations in WOS.
	Sheet DC3 Dippong, T.; Levei, E. A.; Cadar, O; Deac, I.G.; Diamandescu, L.; Barbu-Tudoran, L. Effect of nickel content on structural, morphological and magnetic properties of $Ni_xCo_{1-x}Fe_2O_4/SiO_2$ nanocomposites. J. Alloy. Compd., 786, 330-340, May 25 **2019**. The paper characterizes a series of nanocomposites having the general formula $Ni_xCo_{1-x}Fe2O_4/SiO_2$ (x = 0, 0.25, 0.50, 0.75 and 1.00). IF_{2021}(J. Alloy. Compd.) = 6.371. It has 42 citations in WOS.
	Sheet DC4 Dippong, T.; Levei, E. A.; Cadar, O. Formation, Structure and Magnetic Properties of $Mfe_2O4@SiO_2$ (M = Co, Mn, Zn, Ni, Cu) Nanocomposites. Materials 14, 5, 1139, Mar **2021**. The formation, structure and thermal and magnetic properties have been studied for the nanocomposites $Mfe_2O_4@SiO_2$ (M = Co, Mn, Zn, Ni, Cu) (60% Mfe_2O4/40% SiO_2), produced by a modified sol-gel method followed by annealing at 300, 600, 900 and 1200 °C. IF_{2021} (Materials) = 3.748. It has 41 citations in WOS.
	Sheet DC5 Dippong, T.; Toloman, D.; Levei, E.A.; Cadar, O.; Mesaros, A. A possible formation mechanism and photocatalytic properties of $CoFe_2O_4$/PVA-SiO_2 nanocomposites. Thermochim. Acta, 666, 103-115, Aug 10 **2018**. The paper presents the synthesis of CoFe2O4 nanocrystallites embedded in the hybrid matrix PVA-SiO_2 by a modified sol-gel method. IF_{2021} (Thermochim. Acta) = 3.378. It has 38 citations in WOS.

1.3. The internal quality assurance system for doctoral fields within the IOSUD-UTCN doctoral school

1.3.1. Objectives and structure of the internal quality assurance system

The basic objective of the IOSUD-UTCN Doctoral School is to organize and develop doctoral education and in-depth scientific research in accredited doctoral fields, at national and international standards of excellence, in the context of interaction with the economic, social and academic environment at local, national, European and international level by:

÷ the provision of doctoral degree programmes in collaboration with faculties and Doctoral Programme Coordinating Councils;

÷ development and implementation of a quality management system to continuously improve the quality of doctoral programmes;

÷ developing the necessary procedure for assessing the content of doctoral degree programmes to ensure that they correspond to level 8 qualifications according to the European qualifications framework regulation (HCA 120-12) and associated operational procedure (PO 04 IOSUD).

The architecture of the quality assurance system for doctoral studies involves the following key stakeholders and areas of competence:

÷ Council for Doctoral Studies (CSUD), responsible for strategic and decision-making processes in accordance with IOSUD-UTCN strategic plans;

÷ UTCN Doctoral School, responsible for the management and administrative processes necessary for the initiation, conduct and completion of doctoral studies;

÷ Doctoral supervisors, responsible for the core processes of doctoral supervision and doctoral scientific research, including good research practices, research methodologies, dissemination of results and academic ethics;

÷ Doctoral students, responsible for the fulfillment of contractual obligations and for the implementation of the Advanced University Studies-based Training Programme (UASTP) and the Individual Scientific Research Programme (ISRP), with the aim of transferring skills and research results to the socio-economic environment;

Office of Academic Ethics and Integrity (BEIA) was established within IOSUD-UTCN by HS 1407, in accordance with the provisions of OM 5255 on the verification of academic ethics and deontology in the preparation of doctoral theses from 1990-2016. The department is subordinate to the CSUD and is responsible for digitizing and verifying all doctoral theses, as well as training trainers in ethics and integrity, including the operation of anti-plagiarism software. In support of the work of verification of doctoral theses from 1990-2016, the Procedure for the verification of compliance with ethics and academic deontology in the elaboration of doctoral theses (1990-2016) in IOSUD - UTCN has been developed (see HCA 131-26) and the Strategy for preventing and combating plagiarism in the Technical University of Cluj-Napoca(see HCA 131-27).

Related structures within UTCN (Prorectorate for Scientific Research and Information Infrastructure, Prorectorate for International Relations, Directorate for Management of Research, Development and Innovation (DMCDI), International Relations Office (BRI), faculties, Doctoral Programs Coordination Councils, Administrative Services, etc.), are responsible for the support processes necessary to carry out the activity of doctoral students in good conditions, academically, logistically and socially.

For each of these actors, a framework for operation and performance is defined in accordance with the legislation and regulations in force and with the IOSUD-UTCN quality assurance strategy. The primary regulations, which refer to direct activities carried out by IOSUD and the Doctoral School, are permanently

available to doctoral students and the public interest on the IOSUD-UTCN website, while the direct regulations that refer to the activity within each doctoral contract are established/agreed by each individual doctoral supervisor. The administrative and support functions dedicated to doctoral students are available through the specialized structures of the Technical University of Cluj-Napoca. The Doctoral School has a specialized Secretariat that facilitates the development of doctoral study programmes for both doctoral students and supervisors.

1.3.2. Quality assurance policies and definition of procedures, beneficiaries and their responsibilities

The main mechanisms implemented to ensure, evaluate and improve the quality of doctoral studies within IOSUD-UTCN are:

÷ Internal and external evaluation: Quality assurance, control and improvement of doctoral studies is achieved through the implementation of internal and external evaluation activities on the scientific, strategic and administrative dimensions. The internal evaluation of the scientific work is done annually with the SIMAC system used for evaluation by all academic staff. PhD supervisors and PhD students have accounts in this system and the reported results are audited internally through the DMCDI. External scientific evaluation is carried out at the level of project proposals and publications by the bodies responsible for these competitions or events. From a strategic and administrative point of view, the work of the Doctoral School as well as decision-making needs are discussed in the CSUD, the Board of Governors (BCA), the Board of Directors (BoD) and the University Senate. Externally, these areas are subject to evaluation according to the legislation, i.e. through public reports of the CSUD Director, respectively through the new accreditation process for Doctoral Schools. The research activities carried out through the doctoral programmes and the related managerial activities are also subject to internal or external audit missions (Court of Auditors, Ministry of National Education).

÷ Corrective and preventive actions: At IOSUD-UTCN level, communication, analysis and decision making processes are implemented to run a complete improvement mechanism with three phases: corrections introduced in time to reduce or eliminate the effects of problems, corrective actions taken based on a detailed analysis to eliminate the causes of deficiencies reported internally (PhD supervisors, PhD students) or externally (CNATDCU) as well as preventive actions and systemic improvements included in strategic plans at institutional or doctoral school level aimed at increasing the quality of doctoral studies in the long term.

÷ Risk management: Regular meetings are held at CSUD and PhD area level to discuss the main risks identified by PhD supervisors and PhD students with regard to the smooth running of their studies. Scientific, legal, economic and social issues are considered, including the functioning of the research infrastructure and the provision of adequate study conditions, for which appropriate mitigation or elimination measures are proposed.

÷ Benchmarking: This mechanism of benchmarking with similar actors in the country or abroad is implemented both at IOSUD-UTCN level through the input of CSUD members and at the level of doctoral study areas. Both the scientific and the management components of doctoral studies are targeted, and best practices and successful solutions in the field are analyzed for their suitability to the situation in UTCN. Regular meetings and discussions with peers (Doctoral School management, PhD supervisors, PhD students) take place, which contribute to the development of mechanisms to foster excellence.

÷ Lifelong learning: doctoral studies are a basic element of the Technical University of Cluj-Napoca's strategy to train high-level specialists capable and interested in continuing their professional development during their career. The role of researchers in both the public and private sectors is to

contribute to the advancement of knowledge and its transformation into products and technologies useful to society, and the foundations of this mental and behavioral construction are laid during doctoral studies through the development of creativity, discipline and meticulousness, as well as research skills in doctoral students.

÷ The role of peer review: Success in research is strictly linked to critical thinking and the ability to continuously improve the work already done. This mechanism is implemented within the doctoral study areas of the IOSUD-UTCN through the widespread conduct of peer review activities within the research collectives, the support of research reports and feedback mechanisms from the mentoring committee, continuous monitoring by PhD supervisors, performance-oriented strategic approaches at the level of the Doctoral School, and externally through the evaluation of project proposals and publications by specialists from home and abroad.

÷ PDCA cycle (Plan-Do-Check-Act): The quality assurance function at IOSUD-UTCN is structured on the four fundamental steps of the PDCA (Plan-Do-Check-Act) improvement cycle. Approaches, actions and projects are discussed in a broad and transparent framework, implemented with the help of the university's human and material resources, and then the results are measured and critically analyzed to determine necessary corrections and opportunities for improvement. These steps are carried out at all relevant levels, from the doctoral training programme of each PhD student, to the level of the research teams, to the PhD students and finally to the IOSUD.

1.3.3. Involvement of staff, doctoral students and external parties in the quality assurance process

The quality of undergraduate, master's and doctoral studies and research activities and service to the community are at the heart of the strategic concerns of the Technical University of Cluj-Napoca, as stated in the Strategic Plan 2020-2024 (HS 1253).

IOSUD-UTCN has concrete structures, strategies and procedures for monitoring and assuring the quality of activities in doctoral studies:

÷ The Commission for Quality Assessment and Assurance (CEAC) which monitors and coordinates the implementation of the quality function at the institutional level; see https://dac.utcluj.ro/CEAC.htm;

÷ Quality Assurance Office, responsible for coordinating the quality assurance process at the educational level and assisting management in making strategic quality decisions; see https://dac.utcluj.ro;

÷ Quality managers at Faculty and Doctoral School level, responsible for implementation;

÷ Office of Academic Ethics and Integrity (BEIA), a department under the CSUD with tasks related to the digitization and verification of all doctoral theses, as well as the training of ethics and integrity trainers, including the operation of anti-plagiarism software.

Each of these roles operates in accordance with approved organizational and operational regulations and bases its work on the UTCN Quality Assurance Code. Within the IOSUD, the duties concerning quality are carried out by the Director of the CSUD.

Concern for quality assurance in doctoral fields is apparent right from the moment of admission to doctoral studies. In accordance with the Regulation on the organization of admission to doctoral studies at the Technical University of Cluj-Napoca (HS 1467) Admission to PhD programmes is based on selection criteria including: academic, research and professional performance, an interest in scientific or artistic/sports research, publications in the field and a proposed research topic. Once admitted, the doctoral student will be mentored by a committee of 3 other UTCN teaching or research staff who hold the title of PhD or at least the position of supervisor, university lecturer or research scientist grade III and who have expertise in the thesis topic(cf. HS 1235 art. 32).

The mentoring committees will check/guide/correct/support the acquisition of knowledge, skills, responsibility and autonomy by doctoral students through the analysis of the scientific research project, progress reports and associated minutes. (cf. HS 1235 Section 3.3. Supervision of work in doctoral degree programmes). The committee meets at least once every 6 months at the request of the doctoral student or supervisor. After each meeting the mentoring committee will draw up minutes recording the progress made by the doctoral student and the committee's recommendations. In addition to the supervision during the PhD program in order to prepare the PhD thesis, the PhD supervisor and the members of the supervision committee will help PhD students to integrate into the scientific community: support in writing scientific articles, presentations for scientific sessions, symposia, conferences, etc. PhD students in Chemistry will participate in the scientific seminars of the Department of Physics and Chemistry or Chemistry-Biology when topics relevant to their scientific research are under discussion and PhD supervisor - PhD student meetings will take place weekly.

Compliance with standards of quality and professional ethics, the originality of the content of the doctoral thesis is the responsibility of both the doctoral candidate and the supervisor (HS 1235, art. 54(6) and 57(4)).

The IOSUD-UTCN Doctoral School is subject to external evaluation every 5 years on the basis of a set of criteria and a methodology established by order of the Minister of Education and Research (HS 1235, art. 74).

Doctoral supervisors are evaluated once every 5 years, focusing mainly on aspects related to the quality of the scientific results of the group led by the doctoral supervisor, mainly on the impact and relevance of the scientific activity of this group at international level, respectively at national level in the case of fields with Romanian specificity and the results of the evaluation are public (HS 1235, art. 75).

The IOSUD-UTCN doctoral school, doctoral supervisors and doctoral students undergo periodic internal evaluation processes on dates set by the CSUD, based on evaluation procedures developed by the CSUD (HS 1235, art. 76). The doctoral areas contribute by providing information on the scientific activity of the doctoral supervisors, infrastructure, logistics existing at the doctoral school and proposals for the completion of the necessary for the smooth running of the activity. The periodic self-assessment of IOSUD-UTCN aims to identify and quantify the degree to which the following objectives have been achieved (HCA 120-11 art. 7):

÷ institutional compliance with legal requirements and good practice in the organization and conduct of doctoral studies;
÷ assessment of human resource issues, research activity, material endowment, etc. at IOSUD-UTCN and UTCN doctoral school level;
÷ qualitative and quantitative evaluation of the research results obtained at the level of the UTCN doctoral school, of the degree of visibility, recognition, professional prestige of doctoral supervisors and doctoral students;
÷ compliance with quality management, professional ethics and institutional transparency procedures at IOSUD-UTCN level, etc.

In HCA 120-11 (Self Assessment methodology IOSUD-UTCN) the SYSTEM OF CRITERIA, STANDARDS AND PERFORMANCE INDICATORS USED IN THE SELF-ASSESSMENT OF THE UTCN DOCTORAL SCHOOL AND IOSUD - UTCN in accordance with OM 3200/2020 published in MO no. 132 of 19.02.2020 is presented.

The content of doctoral degree programmes is evaluated periodically, every 5 years, in order to ensure continuity in the achievement of level 8 qualifications according to the National Qualifications Framework. (see HCA 120-12).

Self-assessment in IOSUD has two further components, assessment at field of study level (HCA 120-10), and at doctoral school level (HCA 112-9).

Updated versions of the METHODOLOGY for self-assessment of the activity of the UTCN Doctoral School have been implemented at the level of the fields within the UTCN/IOSUD Doctoral School (HCA 112-9). The last evaluation process took place in 2021 and also involved the completion of Self-Assessment Sheets by PhD supervisors and PhD students. The results were presented publicly in the form of a report (see Self-assessment report 2021). Details of how the evaluation process is carried out are provided in section C. Quality Management of the internal evaluation report.

Anti-plagiarism verification of doctoral theses is the responsibility of the Office of Ethics and Academic Integrity (BEIA), a department under the CSUD.

1.3.4 The interaction between the quality assurance system and university administration

In accordance with the National Education Law with subsequent additions (LEN 2011), Code of Doctoral Studies with subsequent additions (HG 681), and with the Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca (HS 1235), As of 05.12.2017, IOSUD-UTCN has been organized according to the organization chart presented in Fig. 3.

The organizational framework for doctoral studies is presented in HS 1235 – Chapter 2. In IOSUD-UTCN, doctoral studies are organized in a doctoral school accredited or provisionally authorized in accordance with the legal provisions (HS 1235 art. 7(1)).

The work of the University's doctoral studies is coordinated by the Council for Doctoral Studies (CSUD), which is headed by the Director of CSUD. The function of the Director of the CSUD is assimilated to that of Pro-Rector, in accordance with the legal provisions, and the person occupying it is given the responsibility and authority of the position by right (HS 1235 art. 10(1)).

The Doctoral School is governed by a Doctoral School Director and the Doctoral School Council. The Director of the Doctoral School is assimilated to the Director of the Department. The Council of the doctoral school is assimilated to the Council of the department (HS 1235 art. 19(1)).

Doctoral Programme Coordinating Councils are structures that manage doctoral studies and doctoral students at the level of doctoral fields (HS 1235 art. 22).

The tasks of each structure are detailed in HS 1235 Chapter 2.

1.3.5. Transparency and access to the information of European internal quality assurance system for internal and external beneficiaries

The methodologies, regulations and procedures governing doctoral activity, as well as all information of public interest, are made available to members of the community and interested persons via the IOSUD-UTCN Doctoral School website (http://iosud.utcluj.ro), where information is displayed on: IOSUD-UTCN structure; Legislation underlying doctoral studies at the doctoral school level and the quality assurance system; List of doctoral supervisors with their contact details and research areas; Coordinating councils of doctoral programs; Application forms for affiliation to the UTCN Doctoral School, withdrawal of doctoral supervisor from the UTCN Doctoral School, withdrawal of affiliation of doctoral supervisor from the UTCN Doctoral School; Doctoral-related issues: Legislation, admission, doctoral internship, doctoral thesis defense; Doctoral theses defended, doctoral students-international, doctoral cotutelle, doctoral theses; Postdoctoral activity aspects; Qualification; Order of confirmation; IOSUD- UTCN conferences. Relevant links:

÷ http://iosud.utcluj.ro/structura-139.html (management structure and decisions);

÷ http://iosud.utcluj.ro/scoli-doctorale-146.html (doctoral school and doctoral fields);
÷ http://iosud.utcluj.ro/legislatie-guvernamentala.html (national legislation);
÷ http://iosud.utcluj.ro/hotarari-si-decizii-utcn.html (rulings and decisions of the UTCN);
÷ http://iosud.utcluj.ro/regulamente.html (IOSUD and SD regulations);
÷ http://iosud.utcluj.ro/ordine-de-confirmare.html (confirmation orders);
÷ http://iosud.utcluj.ro/conferinte.html (IOSUD conferences);

The results of the internal evaluation of the quality of education in UTCN are published in the form of Quality Assessment Office Reports or Rector's Reports (see HS 1478 and HS 1621).

1.3.6. Effectiveness of internal quality assurance procedures, structures, and their impact on the doctoral studies activities

The self-assessment report resulting from the self-assessment of doctoral fields and doctoral supervisors is debated in the CSUD, presented to the UTCN Board of Trustees and the University Senate (according to the HCA 120-11 art. 11).

The institutional component of the Report is prepared by the CSUD Director, in collaboration with the CSUD members, the IOSUD-UTCN secretariat and the support services of the Technical University of Cluj-Napoca. The specific component per doctoral field/doctoral school UTCN is prepared by the Director of the UTCN Doctoral School (HCA 112-9), in collaboration with the coordinators of doctoral program councils (HCA 120-10), under the coordination of the CSUD Director.

The effectiveness of internal quality assurance procedures and structures is proven by the high number of approved PhD theses, articles published in ISI-listed journals and their citations. At the time of the report, there are no complaints of fraud related to PhD theses or PhD theses rejected without the right to rework at the level of the IOSUD-UTCN Doctoral School.

In addition, we can also mention the QS Stars certification (4 stars out of 5 possible - Fig. 12) obtained in 2019 by UTCN, which attests to internationally recognized excellence.

1.3.7. Using the information produced by the internal quality assurance system as a tool for quality management and improvement of education and other activities

The results of the evaluations form the basis for continuous improvement of the institutional framework for doctoral studies. Thus, the information from the Self-Assessment Reports is analyzed and used to continuously improve the quality of doctoral studies at the level of:

÷ Developing strategies, policies, and objectives of the quality implementation system;
÷ Developing a culture and environment based on performance, ethics and academic integrity;
÷ Continuous quality monitoring and evaluation in order to correlate student-centered education with the requirements of economic partners and the university's development strategy.

1.3.8. Continuous monitoring, evaluation and improvement of the internal quality assurance system

Continuous development of the quality assurance system is a priority for the Doctoral School of IOSUD-UTCN. Based on the institutional strategy, and feedback from PhD supervisors and PhD students, methodologies, regulations and other documents specific to doctoral studies are periodically reviewed, and the revised forms are submitted to the approval of the governing structures: CSUD, CA, University Senate and implemented in the future work of IOSUD-UTCN.

Relevant annex documents: Strategic Plan (HS 1253), Establishment of BEIA (HS 1407), Institutional Regulation (HS 1235), IOSUD self-assessment (HCA 120-11), SD self-assessment (HCA 112-9), Fields self-

assessment (HCA 120-10), Ensuring EQF Level 8 (HCA 120-12), Self-assessment IOSUD 2021 (http://evaluare-institutionala.utcluj.ro), Enabling and Affiliation Framework (HS 1237), Procedure for enabling (HCA 164-19), Reorganization of Doctoral Schools (HS 856), Rector's Report 2022(HS 1621).

2. The information needed to assess the degree of compliance with the criteria, standards and performance indicators set out in Annex 4 to the guide, accompanied by supporting documents accessible in electronic format

The performance indicators and critical performance indicators related to the external evaluation for the establishment of the Chemistry PhD field in UTCN are detailed below and supported by the evidence in the annexes to the report.

Domain A. Institutional capacity

A.1. Institutional, administrative, managerial structures and financial resources

A.1.1. The institution organizing doctoral studies (IOSUD) has implemented the mechanisms for efficient functioning laid down in the specific legislation on the organization of doctoral studies

A.1.1.1. The existence of specific regulations and their application at the level of the doctoral school to which the doctoral field of study belongs: (a) the regulations of the doctoral school; (b) the methodology for the conduct of elections for the position of director of the Doctoral School Council (CSD), as well as the election of the student representative to the CSD and evidence of their conduct; (c) methodologies for the organization and conduct of doctoral studies (admission of doctoral students, completion of doctoral studies); d) the existence of mechanisms for the recognition of the status of doctoral supervisor and for the equivalence of doctorates obtained in other countries; e) functional management structures (Council of the doctoral school), including proof of regularity of meetings; f) the contract for doctoral studies; g) internal procedures for the analysis and approval of proposals for the themes of the training programme based on advanced university studies.

(a) doctoral school regulations

The activity of doctoral studies within IOSUD-UTCN is carried out in compliance with the national legislation in the field and the internal legislation, approved in the UTCN Senate meetings available in the Regulations section of the IOSUD-UTCN website, http://iosud.utcluj.ro/regulamente.html. The organization and conduct of activities of doctoral students is provided for in the Institutional Regulation on the organization and conduct of doctoral studies at the Technical University of Cluj-Napoca (Annex HS 1235), first adopted by the University Senate Resolution No 268 of 20 June 2014 and periodically updated by the University Senate Resolutions No 770 of 25 May 2017, 901 of 23 March 2019, 1136 of 23 March 2020, 1187 of 4 June 2020, 1235 of 24 September 2020. They are available for consultation on the UTCN website. The Regulations of the Doctoral School of the Technical University of Cluj-Napoca within the IOSUD-UTCN (Annex HCA 68-5), approved by CSUD on 26.03.2018, updated and approved in CA on 23.01.2019. In Annex SD-RMH are the regulations and operational procedures underlying the conduct of doctoral activity within IOSUD-UTCN, also available on the IOSUD-UTCN website.

(b) the methodology for the conduct of the elections for the position of Director of the Doctoral School Council (CSD), as well as the election by students of the representative to the CSD and evidence of their conduct

In 2014, by Order 787/13.11.2014 (OR 787), the directors of the then UTCN doctoral schools were appointed. Other documents that came in addition were Order 1079/22.12.2015 (OR 1079) and Decision No 283/15.11.2016 (DR 283). By HS 856 (annexed) from 15.12.2017, it was proposed to reorganize the UTCN doctoral schools into a single doctoral school, called UTCN Doctoral School, and to set up coordinating councils for doctoral programs. The UTCN Doctoral School currently has 10 Doctoral Programme Coordinating Councils, related to the 14 doctoral study areas (see also http://iosud.utcluj.ro/scoli-doctorale-146.html). Doctoral Programme Coordinating Councils are structures that manage doctoral studies and doctoral students at the level of doctoral fields. They are subordinated to the UTCN Doctoral School and their establishment is approved upon proposal of the CSUD and the Doctoral School by the UTCN Board of Directors and the UTCN Senate. The Doctoral Programme Coordinating Councils are organized by doctoral fields, at the level of the faculty/faculties that supervise the respective doctoral fields. The Coordinating Council of the doctoral programmes is led by a coordinator and the members of the council. The structure and number of members of the Coordinating Board is determined by the CSUD. The number of members of the Coordinating Council within IOSUD-UTCN is set at a maximum of 5. The Coordinating Board consists of 3 PhD supervisors from the related fields and 2 PhD students. The members of the Coordinating Council are elected according to the methodology for the organization of elections and appointment of the leadership of the doctoral school of IOSUD-UTCN. The term of office of the Coordination Council is 5 years. Student-doctoral members of the Coordinating Council who complete their doctoral studies during the Council's term of office lose their membership of the Council on the date of the public defense of their doctoral thesis. By-elections shall be held to fill vacancies on the Coordinating Board and the term of office of the new member shall end when the term of office of the Coordinating Board expires (Annex HS 1235 art 22). In accordance with Article 19 of the Institutional Rules (Annex HS 1235) The Doctoral School is governed by a Doctoral School Director and the Doctoral School Council. The Director of the Doctoral School is assimilated to the Director of the Department (Art. 19(1) in Annex HS 1235). The Director of the Doctoral School is an ex-officio member of the Council of the Doctoral School (Art. 19(3) in Annex HS 1235). The director of the doctoral school is appointed on the basis of the methodology for organizing elections and appointing the director of the doctoral school and approved by the University Senate (art. 19(2) in Annex HS 1235). The appointment integrates consultation with the doctoral supervisors of the doctoral school. The Council of the doctoral school is assimilated to the Council of the department and has a mandate of 5 years (art. 19(8) in Annex HS 1235). The structure and number of members of the Council of each doctoral school of IOSUD-UTCN is established by the CSUD in accordance with the legal regulations in force. The number of members of the Council of the Doctoral School within the IOSUD-UTCN is set at 7: 3 PhD supervisors, 2 PhD students and 2 scientific personalities whose scientific work has a significant international recognition and/or personalities from the relevant industrial and socio-economic sectors (art. 7 in Annex HCA 68-5). The members of the Council of the Doctoral School are elected according to the methodology for the organization of elections and appointment of the leadership of the Doctoral School of the IOSUD-UTCN (art. 19 in Annex HS 1235). The director of the doctoral school leads its council (art. 4 in Annex HS 1023 Doctoral School Elections. Other relevant documents are annex HS 1022 CSUD Elections, Decision 279 of 4.12.2018 on the SSC component (DR 279), Decision 387 of 5.12.2019 on the Composition of the Doctoral School Council (DR 387), Decision No 299 of 03.06.2020 on the composition of the SSC (DR 299) and Decision 502 of 01.10.2020 (DR 502). Student associations and, where appropriate, student representatives shall organize elections among doctoral students, at the level of each doctoral school, for positions in the councils of doctoral schools by universal, direct and secret ballot, with all doctoral students having the right to elect and be elected. The methodology

does not foresee any barriers/restrictions to the right of doctoral students to elect and be elected. The doctoral student representative(s) must be a doctoral student at the time of election. The persons are elected by secret and direct vote of the registered doctoral students. Doctoral student members of the Council of the Doctoral School who complete their doctoral studies during the Council's term of office lose their membership of the Council on the date of the public defense of their doctoral thesis. By-elections shall be held to fill vacancies on the Council of the Doctoral School and the term of office of the new member shall end when the term of office of the Council of the Doctoral School expires (Annex HS 1235 art.19(1-11)). In 2020, the last general election session for the governing structures of IOSUD-UTCN was held. As a result of the election process the new governing structures were appointed through the appointment decisions posted on the IOSUD website: http://iosud.utcluj.ro/structura-139.html. Elections were held online, on Microsoft Teams, for doctoral student representatives at the UTCN Doctoral School level and at the Doctoral Programme Coordinating Councils level in October 2020. The legislative documents underlying the organization of the 2020 elections were posted on the UTCN website: http://utcluj.ro/alegeri/2020/iosud.

The methodology for organizing the general elections and appointing the leadership of the UTCN Doctoral School and the Coordinating Councils of the doctoral programmes within IOSUD-UTCN is regulated by HS 1023 annexed. The methodology for organizing general elections and appointing members of the Council for Doctoral Studies (CSUD) of IOSUD-UTCN is regulated by HS 1022 annexed. Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca - revised, adopted by HS 1235 regulates and Rector's Order No 498 of 30.09.2020 (OR 498) sets out the timetable for the elections for the selection and appointment of the management structures in charge of the organisation of doctoral studies at the Technical University of Cluj-Napoca. Rector's Order no. 503 of 1.10.2020 (OR 503) announces the organization of elections for the selection and appointment of the governing structures in charge of the organization of doctoral studies at the Technical University of Cluj-Napoca. The lists of student-doctoral candidates for the positions of members of the Doctoral School Council, the CSUD and the Doctoral Programme Coordination Councils, according to the provisions of the Election Methodology, are also posted on the website. (see http://utcluj.ro/alegeri/2020/iosud). Eligibility conditions were found in OR 503 announcing the organisation of elections at Doctoral School and Coordination Council level (Art. 2(2) and Art. 2(5) respectively). The same order also specifies what the application file must contain (Art. 5 and Art. 10 respectively). Calendar: http://iosud.utcluj.ro/files/Files/Alegeri%202020/Data%20si%20ora-alegeri-IOSUD-UTCN_2020.pdf. Final list of submitted applications: http://iosud.utcluj.ro/files/Files/Alegeri%202020/Lista%20candidaturi%20depuse%20-%20Structuri%20de%20conducere%20IOSUD-UTCN-Lista%20finala.pdf. PhD students were informed via e-mail about the elections. Voting was organized online and was secret and direct. Minutes were taken by the Election Offices during the elections: http://iosud.utcluj.ro/files/Files/Alegeri%202020/Procese%20verbale_Alegeri_IOSUD-UTCN_2020.pdf. The final results report from the CSUD Election Office has been posted on the website: http://iosud.utcluj.ro/files/Files/Alegeri%202020/Procese%20verbale_Alegeri_IOSUD-UTCN_2020.pdf. Following the election results, Decisions appointing members of the CSUD and CSD management structure were issued and posted on the IOSUD website: DR 538 (CSD members), DR 539 (CSUD members) and DR 540 (appointment of programme managers). On 13.12.2021 by-elections were held for the positions of CSUD Members - Doctoral Students - Electrical Profile and Coordinator of the Coordinating Council of Humanities Doctoral Programs. (see http://www.utcluj.ro/alegeri/2021/iosud). On 31.01.2022 by-elections were held for the Coordinator of the Coordinating Council of Doctoral Programs Humanities - Doctoral Supervisor of IOSUD-UTCN (see https://www.utcluj.ro/alegeri/2022/iosud).

(c) methodologies for the organization and conduct of doctoral studies (admission of doctoral students, completion of doctoral studies)

UTCN has defined a calendar (see Detailed 2023 admission calendar) and a transparent and rigorous student recruitment and admissions strategy, respecting the principle of equal opportunities for all applicants without discrimination. The rules are updated every year in line with legislative changes (HS 1467 annexed, also available on the university's website under http://iosud.utcluj.ro/regulamente.html). In accordance with Article 9 of HS 1467, the admission session periods, the application documents and the competition tests shall be made public at least 6 months before the admission competition, by publication on the IOSUD-UTCN's own website in both Romanian and English. Admission to doctoral studies (art. 27(1) in HS 1467) consists of at least two examinations held in front of an admission committee made up of the PhD supervisor who offered the student-doctoral place for admission and at least two other specialists from the Technical University of Cluj-Napoca who hold at least the position of university lecturer or scientific researcher grade II.

The chair of the admission committee is the PhD supervisor. A test consists of a language proficiency exam for an international language held in the Department of Modern Languages and Communication of UTCN or the Faculty of Letters of CUNBM. The admissions committees are proposed by the Doctoral Program Coordinating Councils and the Doctoral School Council and approved by the CSUD Director. The second test is the interview, in which the candidate's level of training and scientific/professional concerns, research skills and proposed topic for the doctoral thesis are analyzed. Depending on the specificities of the field, other tests may be foreseen in the PhD admission competition, at the request of the PhD supervisors and with the agreement of the Doctoral School Council. The minimum average that a candidate must obtain to be declared admitted is 7.00. The average is calculated to two decimal places without rounding.

Doctoral studies are completed by the defense of the doctoral thesis in a public hearing before the doctoral thesis analysis and public defense committee. The basis for the completion of doctoral studies are the Institutional Regulations on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca (Annex HS 1235), Procedure for the completion of doctoral studies at IOSUD-UTCN approved in C.A. of 12.11.2019 (HCA 140-14). In order to inform and support doctoral students on the completion of their doctoral studies, IOSUD-UTCN has developed and made available to doctoral students on the UTCN website the Guide for the elaboration of the doctoral thesis, the model and the cover of the thesis, as well as the other forms necessary for the doctoral thesis defense session (see annex C211).

(d) the existence of mechanisms for recognising the status of doctoral supervisor and the equivalence of doctorates obtained in other countries

In accordance with OM no. 5921/06.12.2016 (doctoral leadership), OM no. 5922/06.12.2016 (teaching function), OM no. 5923/06.12.2016 (doctoral title), for the approval of the Methodology for the automatic recognition of the above-mentioned qualifications, the IOSUD-UTCN automatically recognises the qualification of doctoral supervisor obtained at accredited higher education or research and development institutions in a Member State of the European Union, the European Economic Area and the Swiss Confederation, accredited higher education or research and development institutions included in the List of prestigious universities in other countries, approved by order of the competent minister, periodically updated, accredited higher education or research and development institutions subject to an international mutual recognition convention concluded at intergovernmental or inter-university level. At IOSUD-UTCN level, the procedure for the recognition of the status of PhD supervisor is based on the Regulation for obtaining the habilitation certificate and affiliation to the Doctoral School of the Technical University of Cluj-Napoca (see HS 1237 annexed), which establishes the conditions for obtaining the status of PhD supervisor

and affiliation to the UTCN Doctoral School. Related documents are available on the IOSUD-UTCN website (http://iosud.utcluj.ro/regulamente.html). Relevant documents are: HS 1237, HS 1238, HCA 164-19. The equivalence of the doctorate, the teaching position and the doctorate supervision is based on the methodologies for their recognition by the Technical University of Cluj-Napoca (HS 722, HS 723 and HS 724 annexed).

(e) functional leadership structures (Doctoral School Council) including proof of regularity of the convening of meetings

UTCN is an Organizing Institution of Doctoral Studies, and within it the doctoral studies are organized in an accredited doctoral school according to the legal provisions. IOSUD-UTCN provides institutional, administrative and logistical support to the component doctoral schools. Functional management structures exist within IOSUD-UTCN. The Doctoral School is managed by the Doctoral School Council and the Director of the Doctoral School. The organization, composition and attributions of the Doctoral School Council are set out in articles 19-20 of the Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca. (annex HS 1235). The Council of the Doctoral School is assimilated to the Council of the Department and has a mandate of 5 years. The structure and number of members of the Council of each doctoral school of IOSUD-UTCN is established by the CSUD in accordance with the legal regulations in force. The number of members of the Council of the Doctoral School in IOSUD-UTCN is set at 7.

The Council of the Doctoral School is composed of a maximum of 50% PhD supervisors from the Doctoral School, 20% PhD students, rounded up if necessary, the rest being completed by members from outside the Doctoral School chosen from scientific personalities whose scientific work has a significant international recognition and/or personalities from relevant industrial and socio-economic sectors. The members of the Council of the Doctoral School are elected according to the methodology for the organization of elections and appointment of the leadership of the Doctoral School of IOSUD-UTCN (art. 19(1-11) in HS 1235; art 7 in HCA 68-5). The director of the doctoral school leads its council (art. 4 of HS 1023). Relevant documents on elections are: Decision 279 of 4.12.2018 on the CSD Component (DR 279), Decision 387 of 5.12.2019 on the Composition of the Doctoral School Council (DR 387), Decision No 299 of 03.06.2020 on the composition of the SSC (DR 299) and Decision 502 of 01.10.2020 (DR 502). Here is an example of the Minutes of such a meeting (see PV_2021), other such supporting documents may be made available by the CSUD and IOSUD secretariat.

(f) the doctoral studies contract

The rights and obligations of doctoral students are laid down in the doctoral studies contract. After being declared admitted, the doctoral student concludes with IOSUD-UTCN a Doctoral Studies Contract and a Discipline Contract. These are available each year on the IOSUD -UTCN website and updated as needed. The latest version of the contract has been published for each field (see examples: Contract for Architectural doctoral studies 2021, Contract for doctoral disciplines 2021). The contract includes the minimum standards for the award of the doctoral degree specific to each field of doctoral studies, according to Order no. 5110/2018 of 17 September 2018 approving the minimum national standards for the award of the doctoral degree. There have also been recent updates related to the publication of doctoral theses following the receipt of address 83/GP/10.02.2020 from the Ministry of Education and Research. Together with these contracts, PhD students also complete a document concerning the processing of personal data as a result of the regulations in force on the protection of personal data (see Annex Contract general notification doctoral students contract).

The doctoral studies contract is concluded with each doctoral student in three copies and is signed by: The doctoral student, the PhD supervisor, the legal advisor, the economic director and the Rector. The

Discipline Contract specifies the subjects of the Advanced University Training Programme and the Scientific Research Programme to be completed by the doctoral student and is signed by: Doctoral student, Doctoral supervisor, Doctoral program council coordinator, Doctoral school director and CSUD director. The models of the Doctoral Programme Framework Contract and the Discipline Framework Contract are drawn up by the Doctoral School, endorsed by the Doctoral School Council and approved by the CSUD.

(g) internal procedures for reviewing and approving proposals for the subject matter of the advanced degree-based training programme

In accordance with the IOSUD-UTCN Doctoral School Regulations (Annex HCA 68-5), Doctoral programmes are under the coordination of the Doctoral Programme Coordination Councils, whose tasks include (Art. 8(2)): validating the scientific research programmes for doctoral students; preparing and proposing the content of the doctoral study programmes approved by the CSUD; adopting the necessary measures to ensure the quality of doctoral studies, for the proper conduct of periodic evaluations of the doctoral school and doctoral supervisors, for compliance with the rules of ethics and deontology and for the external evaluation process for accreditation/reaccreditation or provisional authorisation of the doctoral school. According to Art. 9, para. (12) of HCA 68-5, The Coordinating Council of the doctoral programmes of each field draws up and proposes the structure and content of the general doctoral programme according to the appropriateness of the themes and/or disciplines and current legislation. The programme is then approved by the CSUD. Art. 9(13) of HCA 68-5 stipulates, among other things, that responsibility for the content of the doctoral programme lies with the doctoral supervisor. The topic of the scientific research project is determined by the doctoral supervisor together with the doctoral student and is related to the university's advanced training programme, programmes and institutional policies. (see HS 1235 - art. 50(1)).

In order to carry out the doctoral programme in good conditions, the PhD student is supported, in addition to the PhD supervisor, by a committee of 3 other teaching or research staff from UTCN (who have the title of doctor and at least the position of supervisor, university lecturer or research scientist grade III). In addition, the committee may include one additional member with a doctoral degree, from outside UTCN with an advisory role and expertise in the subject of the doctoral thesis, who may come from other universities or from relevant industrial and socio-economic sectors, affiliated or not affiliated to the doctoral school. The structure of the committee shall be determined by the doctoral supervisor, in consultation with the doctoral student, no later than 30 days from the date of registration. The main role of the doctoral student's committee is to assist the student during the doctoral program in order to prepare the doctoral thesis (Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca) - HS 1235 art. 32; see also http://iosud.utcluj.ro/stagiul-de-doctorat.html).

The mechanisms for reviewing and approving each doctoral student's topic are implemented throughout the duration of his or her doctoral activity, and can be highlighted as follows: during the admission process, the topic proposed by the doctoral supervisor is evaluated together with the doctoral student during the interview by the admission committee (Doctoral Admission Regulations, see appendix HS 1467 art. 27), the subject of the research project is submitted to an examination committee (see Annex HS 1235 art. 50 (3,4)), the individual research programme is reviewed every six months by the mentoring committee through the doctoral student's submission of scientific research reports (see Annex HS 1235 art. 52). IOSUD-UTCN encourages the proposal and undertaking of development projects that contribute to increasing the quality of doctoral studies and research and innovation results. Doctoral students and supervisors benefit from the academic and administrative support of the Doctoral School and are supported in proposing and carrying out research and development themes for products, technologies or artistic and

humanistic contributions. The research topic proposed by the PhD supervisor is in line with the specific research topics of the center/college to which the PhD supervisor is affiliated (see HCA 68-5 annexed).

The number of doctoral places requested to MEC by UTCN for funding from the state budget, the total number of places for which admission is organized (cumulating the budgeted places approved by MEC and the paid ones) as well as their distribution in UTCN are proposed by CSUD, endorsed by the Administrative Council and approved by the University Senate for each academic year. In allocating doctoral places for each field, account is taken each year of the availability and workload of doctoral supervisors, their individual performance, and the cumulative performance of each doctoral field established on the basis of a set of criteria proposed by the CSUD, endorsed by the Administrative Council and approved by the University Senate (HS 1235 art.26(1,2)).

Annex HCA 68-5 contains the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN.

Annex HS 630 contains the methodology for the conduct of the competition for the position of CSUD Director and the conduct of the election process at IOSUD-UTCN level is public (see http://utcluj.ro/alegeri/2022/iosud).

Annex HS 1467 contains the updated regulations on the organization of admission to the cycle of doctoral studies in UTCN.

Annex HCA 140-14 contains the operational procedure for the completion of doctoral studies at IOSUD-UTCN.

Annex HS 723 contains the methodology for the recognition by UTCN of the doctoral degree and the title of doctor in science or a professional field obtained abroad.

Annex HS 724 contains the methodology for the automatic recognition by UTCN of the quality of doctoral supervision obtained in foreign accredited university education institutions.

Annex A111e contains the acts governing the governing structures and the convening of their meetings, information which is also published online as follows:

At the link http://iosud.utcluj.ro/scoli-doctorale-146.html is public information on the management of the doctoral school;

At the link http://iosud.utcluj.ro/hotarari-si-decizii-utcn.html there is public information on the periodicity of decision-making

At the link http://utcluj.ro/alegeri/2019 is the public information on the conduct of UTCN elections 2019-2022;

At the link http://utcluj.ro/alegeri/2022/iosud/ is the public information on the conduct of IOSUD elections 2019-2022;

Annex A111fg comprises the set of documents relating to the study contract and the internal procedures for reviewing and approving proposals for the subject matter of the advanced degree-based training programme.

A.1.1.2. The regulations of the doctoral school include mandatory criteria, procedures and standards for the aspects specified in Article 17 para. (5) of the Code of Doctoral Studies, approved by Government Decision No 681/2011, as amended and supplemented

The UTCN Doctoral School Regulations include mandatory criteria, procedures and standards for the aspects specified in Art.17, para. 5 of Government Decision no. 681/2011 with reference to:

a) Conditions for habilitation, acceptance of new doctoral supervisors and retirement

are set out in Chapter 7. Conditions for habilitation, affiliation to the Doctoral School and withdrawal from the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (HCA 68-5), Operational procedure for habilitation within IOSUD - UTCN, Edition II, Revision 1 approved in the

Board of 22.02.2022, Operational procedure for habilitation within IOSUD-UTCN_24.09.2020, Regulation for obtaining the habilitation certificate and affiliation to the Doctoral School of the Technical University of Cluj-Napoca of 16.09.2020 (HS 1237). Article 22 of the UTCN Doctoral School Regulations (HCA 68-5) states that the verification of the minimum qualification standards, drawn up by the candidates in accordance with the legal standards in force for the field concerned, is carried out by the Coordination Councils of the doctoral programmes. The composition of the committee for the verification of the degree of fulfillment of the habilitation standards is made in accordance with HCA 21 from 16.02.2021. The final report on the fulfillment of the habilitation criteria and the composition of the committee are endorsed by the Doctoral Programme Coordination Council and the Doctoral School Council. According to art. 23 - point 5 of the Doctoral School Regulations (HCA 68-5), The Council of the Doctoral School together with the Coordinating Council of the doctoral programme in the field concerned examines the application for acceptance of the candidate, the appropriateness of receiving new members in the Doctoral School and the fulfillment of the criteria in the Doctoral School Regulations, and in case of a favorable decision, the Director of the Doctoral School forwards to IOSUD-UTCN the favorable opinion (extract from the minutes of the Council meeting) together with the related documents. IOSUD-UTCN submits the file to the CSUD and then to the UTCN Senate for validation. The decision of the UTCN Senate is communicated to the relevant Ministry. Withdrawal of UTCN Doctoral School membership (HCA 68-5 art. 24) may be made: (i) at the written request of the doctoral supervisor member of the Doctoral School, (ii) at the request of the external or internal periodic evaluation committee, or (iii) in other situations deriving from the normative acts in force or the internal regulations of the university. The removal of a doctoral supervisor from the IOSUD-UTCN Doctoral School shall be carried out under the conditions mentioned in HCA 29 from 09.03.2021. Application forms for UTCN Doctoral School Affiliation, UTCN Doctoral School Supervisor Withdrawal and UTCN Doctoral School Supervisor Affiliation Withdrawal are available on the IOSUD-UTCN website.

b) the mechanisms by which decisions are taken regarding the appropriateness, structure and content of the advanced degree-based training programme

are regulated in the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (HCA 68-5) at art. 9(12): Advanced degree-based training programme: purpose, structure and content; Art 9(13): Advanced degree-based training programme: timeliness, accountability (HCA 68-5) as well as by CHAPTER 4. Doctoral degree programmes: purpose, structure and content of the Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programmes at the Technical University of Cluj-Napoca (HS 1235).

c) procedures for changing the doctoral supervisor of a given doctoral student

are set out in Art. 17 and Art. 18 of Chapter 5. Change of PhD supervisor and conflict mediation procedures of the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (Annex A.1.1.1._Regulamento_Școlleii_Doctorale_UTCN). On the IOSUDUTCN website is posted the standard application for change of scientific supervisor (Request for change of coordinator). The procedure for mediating conflicts between the PhD supervisor and the PhD student is provided in the same chapter in Art. 19.

d) the conditions under which the doctoral programme may be interrupted

are stipulated in CHAPTER 4. Compliance with the deadlines of the Advanced University Training Programme (UTPP), the Scientific Research Programme (SRP) and the public defense of the doctoral thesis - Art. 11 of the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (Annex A.1). .1.1._Regulament_Regulamento_Școlii_Doctorale_UTCN). The interruption is approved by the Director of CSUD, at the request of the PhD student, with the opinion of the PhD supervisor and that of the Council of

the Doctoral School. The IOSUD-UTCN website displays the standard request for interruption of the traineeship (Request for interruption of traineeship).

e) how to prevent and sanction fraud in scientific research, including plagiarism

are laid down in the Procedure for the prevention and enforcement of ethics and academic integrity within IOSUD-UTCN (Ethics Procedure HCA din 9.03.2021), Doctoral School Regulations (art. 15(1) in HCA 68-5), Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs at the Technical University of Cluj-Napoca (HS 1235 Section 5.2 Respect of scientific ethics - art. 57), Strategy to prevent and combat plagiarism in UTCN (HCA 131-27) and Procedure for verifying compliance with academic ethics and deontology in the elaboration of doctoral theses (period 1990-2016) within IOSUD - UTCN (HCA 131-26). Sanctioning fraud in scientific research is provided for in Chapter 9. Observance of scientific, professional and academic ethics - Art. 27(3) of the HCA 68-5.

f) ensuring access to research resources

is stipulated in art. 9(14 a-d) - PhD student access to research resources of the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (HCA 68-5), Procedure for the Prevention and Enforcement of Ethics and Academic Integrity in IOSUDUTCN Edition 1, Revision 0 (Ethics Procedure HCA din 9.03.2021), Procedure for the verification of compliance with academic ethics and deontology in the elaboration of doctoral theses (period 1990-2016) within IOSUD - UTCN from 19.10.2021 (HCA 131-26) and the Doctoral Studies Contract (Contract for architectural doctoral studies 2021).

g) attendance obligations of doctoral students

are provided for in CHAPTER 4. Compliance with the deadlines of the advanced university training programme (PPUA), the scientific research programme (PCS) and the public defense of the doctoral thesis - art. 10-14 of the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (HCA 68-5) and in the Doctoral Study Contract (Contract for architectural doctoral studies 2021).

Annex HG 681 contains the code for doctoral studies;

The webpage http://iosud.utcluj.ro/scoli-doctorale-146.html contains links to:

÷ Application for the allocation to SD;
÷ Request for withdrawal of PhD supervisor from SD;
÷ Request for withdrawal of PhD supervisor affiliation from SD;

The webpage http://iosud.utcluj.ro/stagiul-de-doctorat.html contains links to:

÷ Request for interruption of the traineeship;
÷ Request for extension of probationary period;
÷ Request for grace - CSUD;
÷ Request for pardon - SENATE;
÷ Request for doctorate withdrawal;
÷ Request for change of scientific supervisor;
÷ Request for change of thesis title;
÷ Request for change of thesis defense president;
÷ Request for IOSUD transfer;
÷ Request for removal of doctoral students from the register;

Annex HS 1235 art. 30 alin. 2 stipulates the conditions under which the doctorate can be interrupted;

In Annex HS 1235 art. 67 alin. 2 the procedures for changing the doctoral supervisor are laid down;

In Annex HS 1235 art. 47 alin. 3-7 the mechanisms by which decisions on the appropriateness, structure and content of the advanced degree-based training programme are taken are provided for;

Annex HCA 131-26 contains the operational procedure for checking theses;

Annex HCA 131-27 contains the thesis verification strategy;

Annex PO 03 IOSUD contains the procedure for preventing and ensuring compliance with the rules of ethics and academic integrity;
Annex HCA 68-5 art. 9 alin. 14 provides for easier access to research infrastructure;
Annex HCA 68-5 art. 14 provides for compulsory attendance in accordance with the methodology developed by the Ministry in force;
Annex HCA 68-9 provides access to the electronic resources Anelis and Turnitin.

A.1.2. IOSUD is equipped with the necessary logistical resources to carry out the mission of doctoral studies

A.1.2.1. The existence and effectiveness of an adequate IT system for the registration of doctoral students and their academic career

The Doctoral School Digitisation Platform is a web application consisting of 10 modules that provides electronic management of the information flows in the Doctoral School. This application runs on server hardware to ensure 24/7 availability for the http://doctorat.utcluj.ro

The management of information flows is divided into stages. The modules that make up the application are:

÷ Role and permissions management module
÷ Admission and authentication module
÷ Internationalization module
÷ Doctoral student management module
÷ Application management module
÷ Document generation and upload module
÷ PhD thesis public submission module
÷ Statistics generation module
÷ Data export and archiving module
÷ “dCard” digital card identification module

The platform currently manages data on admissions, mentoring committee, contracted subjects, research topic and other information for over 200 PhD students. The platform is continuously developing by adding new modules, such as the inclusion of a module containing PhD thesis abstracts. The platform also provides its users with email notifications for various important events such as:

÷ Change of stage of a candidate or doctoral candidate
÷ Sending, receiving, updating digital requests
÷ Uploading, modifying, updating documents, etc.

The http://doctorat.utcluj.ro platform provides users with an electronic identification system based on a free electronic card with a temporary QR code and has a role-based authorisation system and permissions so that the application is secure in terms of access. Currently there are Administrator, Staff, Leader, Doctoral Candidate, Candidate roles and over 200 permissions.

SIMAC (http://research.utcluj.ro/index.php/simac.html) assesses using several criteria the academic work of UTCN staff, including PhD students, allowing also a qualitative assessment of their performance based on rules established at university level.

Annex A121 contains:

÷ PhD application presentation http://doctorat.utcluj.ro/;
÷ PhD application tutorial http://doctorat.utcluj.ro/;
÷ SIMAC Rulebook;
÷ SIMAC User manual;

÷ Reports obtained using SIMAC.

A.1.2.2. The existence and use of an appropriate IT program and evidence of its use for checking the percentage of similarity in all PhD theses

Technical University of Cluj-Napoca promotes the principles of deontology and ethics in scientific research (PO 03 IOSUD), for the training, development and motivation of human resources in the conduct and completion of organized university studies at all levels: teaching staff, undergraduate, masters, doctoral and postdoctoral students, and has developed a strategy to prevent and combat the phenomenon of plagiarism (Annex HCA 131-27). In order to check the originality of scientific papers, research reports and PhD theses, since 2016 the **anti-plagiarism software Turnitin** is used, to which access has been created for all PhD supervisors.

The way of working with the Turnitin software is specified in the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN, at art. (15): "The UTCN Doctoral School must carry out the anti-plagiarism check (using the TURNITIN software provided by UTCN) and draw up the similarity report, through the person designated for this purpose, member of the Coordination Council of the doctoral program in the field concerned. ", and the typical procedure to be followed for the verification of the doctoral thesis is detailed in the Anti-Plagiarism Procedure and the Procedure for the completion of doctoral studies within IOSUD-UTC-N (PO 01 IOSUD).

IOSUD-UTCN has a subscription to the specialized platform for TURNITIN similarity checking. All doctoral theses are verified using this platform as part of the preparation process for public defense, and the doctoral candidate and supervisor take responsibility for the results of the verification carried out in accordance with internal regulations and good practice specific to the field by signing a dedicated form. All PhD supervisors have individual accounts within the UTCN institutional account, and PhD students have access through their supervisors. Widespread use of this mechanism for all elements of scientific production is encouraged, and in recent years a culture of plagiarism prevention, verification and sanctioning has developed within the institution, which forms the basis for quality scientific production in line with internationally accepted academic ethics standards. IOSUD can prove the contracting of the software application that allows the verification of the degree of similarity of the scientific achievements of doctoral students, including the doctoral thesis, with other existing scientific or artistic works through the attached documents.

Turnitin is entrusted with the elaboration of the Similarity Report by which the designated expert from each field carries out the anti-plagiarism verification of the PhD theses to be defended within 30 days from the submission of the Application for the start of the pre-submission procedure. The acceptance report of the doctoral supervisor, in which he/she agrees to the organization of the public defense of the doctoral thesis, mentions that the content of the thesis has been checked with the Turnitin similarity analysis program, made available to the Doctoral School by UTC-N. The PhD thesis similarity report is uploaded to the national platform after the public defense.

Annex A122 contains:

÷ OM 3485 Minister's Order including TurnItIn as an appropriate anti-plagiarism system;

÷ HCA 9 on access to the TurnItIn anti-plagiarism verification system;

÷ Turnitin Description Description of the programme for checking the similarity of doctoral work;

÷ Turnitin administrator Guide;

÷ Turnitin instructor Guide;

÷ Guide for similarity interpretation, for instructor and student;

÷ Report Model for similarities;

÷ Acceptance report for similarities;

÷ Report of similarities.

A.2. Research infrastructure

A.2.1. IOSUD has a modern research infrastructure that supports the development of specific activities

A.2.1.1. The premises and the material equipment of the doctoral school allow for research activities in the field evaluated, in accordance with the mission and objectives (computers, specific software, apparatus, laboratory equipment, library, access to international databases, etc.). The research infrastructure and the offer of research services are presented to the public via a profile platform. The research infrastructure described above, acquired and developed in the last 5 years.

The research activity of PhD students in Chemistry will be carried out mainly in the teaching and research laboratories where their PhD supervisors are working. In this respect, the information given above on teaching and research premises and equipment is relevant (Spaces Sheet), Computers (Sheet Calc), Softwares (Sheet Soft), Books database (Bib Books), Magazine exchange agreements (Bib Reviste), Equipment purchased in the last 5 years (Sheet e5ani), Subscribed electronic resources (Resources Sheet), plus the mobilities that students and teachers can access institutionally (Mobility Sheet). The laboratories contain the furniture and equipment necessary to carry out practical activities specific to the disciplines of the field (Sheet Spații). In addition, the teaching staff coordinating their PhD are part of internally accredited research structures (Fișă Grup) and services offered by these research structures are promoted on the ERRIS platform (Fișă ERRIS), which is a good opportunity to initiate collaborations with the private sector.

Among the facilities resulting from interpersonal collaborations, the infrastructure available at ITIM (through Conf. Simona Rada) stands out. An important part of UTCN's budget is directed towards equipping the laboratories with high-performance equipment. The research infrastructure acquired in the last 5 years is shown in the annex Sheet e5ani and in brief as follows: analyzer for determination of specific surface area and porosity, inv. 101268, 09.11.2018; portable analyzer for combustion gasses and emissions testo 350, inv. 101054, 18.07.2018; measuring and control apparatus for vacuum (vacuum meter), inv. 101010, 06.07.2018; pressure washer karcher hd 5/15cx plus, inv. 101074, 24.07.2018; melting point determination apparatus with cooling, inv. 101024, 11.07.2018; apparatus gsp - 730 spectrum analyser, inv. 100978, 06.06. 2018; apparatus for thin film deposition by immersion (spin coater), inv. 102035, 25.09.2020; apparatus for thickness measurement, inv. 101394, 15.02.2019; industrial vacuum cleaner - nt 80/1 b1 m s * eu for metal powders, inv. 102264, 28.05. 2021; ultrasonic bath elma 15h hj 587630 with attachments : elmasonic basket 17 hj 5876333 1 pc; plastic lid hj 5876324 - 1 pc, inv. 101092, 20.08.2018; water bath julabo pura 4+ lid forpura 4, inv. 101594, 16.09.2019; analytical balance aln120m, inv. 100965, 24.05.2018; axis scale, model ata 1200, inv. 101795, 09.12.2019; ohaus scale pr1602m, inv. 102039, 08.10.2020; ohaus scale pr1602m, inv. 102040, 08.10.2020; digital titrette model titrette with accessories 25 ml, inv. 101583, 10.09. 2019; hard metal grinding bowl, 250ml features-wolfram carbide, with € housing, inv. 102575, 25.11.2021; hard metal grinding bowl, 80ml features: wolfram carbide, with € housing, inv. 102576, 25.11.2021; zirconium oxide grinding bowl, 500ml, inv. 102574, 25.11.2021; calorimeter c1 1/12 with cooler included, halogen

resistant, inv. 101831, 13.12.2019; calorimeter with accessories (digital thermometer and propeller), inv. 102963, 17.08.2022; calorimeter xry -1a+(calorimeter pump with integrated printer, complete set, modelxry), inv. 101748, 19.11.2019; ultra-low vacuum camera with accessories, inv. 101937, 28.05.2020; hyperspectral camera sp-fx10-gige, spectral range 400-1000nm: 220 spectral bands; incl. lens fov 40*; snr(/peak)600:1 ; gige interface(fx series cable included);software: lumo.., inv. 101730, 06.11.2019; eb wifi thermal chamber, inv. 101520, 30.07.2019; db-wax ui 30m, 0, 32mm, 0, 25 microns, intuvo chromatography column, inv. 102759, 14.06.2022; compactrio controller model: crio-9053, 1.33 ghz dual -core, artix-7 50t fpga, 4-slot, rt, non-xt, inv. 103267, 09.12.2022; oakton 6+ portable conductometer, 0-200 ms/cm, inv. 102766, 20.06.2022; geiger gamma-scout radiation counter online, inv. 101964, 12.06.2020; sn it2208c342 turbomolecular vacuum pump controller, inv. 102706, 06.05. 2022; electronic heating nest km - mer 450*c for 100ml flasks, inv. 101112, 23.08.2018; dc rotating machine 30 w- single-phase inverter az 11, inv. 101796, 09.12.2019; digital detector for air quality measurement, inv. 102997, 22.09.2022; dynamometer fb1k nr series 275, inv. 101696, 22.10.2019; dynamometer fb20k nr series 129, inv. 101697, 22.10.2019; water distiller ws 4000, inv. 102791, 30.06.2022; portable hardness tester with accessories, inv. 101561, 30.08.2019; rockwell wilson 574r hardness tester, inv. 102853, 29.07.2022; electrospindle qn31 18 18 er 32, inv. 102630, 13.12.2021; emotiv epoc x 14 channel, inv. 102074, 17.11.2020; forced ventilation oven fd115, inv. 101178, 11.10.2018; drying oven biobase bov -45f, 45l, inv. 101938, 28.05.2020; flocculator, inv. 101023, 11.07.2018; gimbal flir vue pro r, inv. 103246, 15.11.2022; goniometer, inv. 102372, 31.08.2021; laser engraver 40w-k3020, inv. 102312, 15.07.2021; griper with force - feedback with 2 fingers, inv. 101725, 31.10.2019; central cubic cooker hood without motor, inv. 103336, 20.12.2022; central cubic cooker hood without motor, inv. 103337, 20.12.2022; cubic cooker hood for ovens, inv. 103368, 20.12.2022; cubic furnace hood, inv. 103369, 20.12.2022; incinerator i8-105(gen), inv. 101832, 13.12.2019; incinerator i8-105(gen), inv. 101832, 13.12. 2019; dini argeo indicator, model 3590 ekr-1, inv. 101727, 05.11.2019; magnetic powder breake unitanexe:breake controller -1 pc-10664 lei;, inv. 101827, 12.12.2019; adam anti-vibration table for scales, aluminium, inv. 101970, 15.06.2020; adam anti-vibration table for scales, aluminium, inv. 101971, 15.06.2020; optical table (nexus) 900 mm x 1200 mm x 110 mm, inv. 102847, 27.07.2022; mass electrode erosion machine, inv. 101436, 19.06.2019; mass flow controller, inv. 101245, 07.11.2018; binocularoptika microscope with b-190tb slide, inv. 101580, 10.09.2019; bresser science trm-301 microscope, inv. 100988, 18.06.2018; bresser science trm-301 microscope, inv. 100989, 18.06.2018; kerr effect microscope magneto-opticsursa high power led microscope, inv. 102468, 20.10.2021; mitutoyo tm-505b measuring microscope, inv. 103296, 14.12.2022; didgiphot digital microscope features: dm-5000 u 5 mp, usb, 15x-365x, inv. 101435, 18. 06.06.2019; metallographic microscope kruss mbl 3300, inv. 102344, 03.08.2021; metallographic optical microscope, inv. 101525, 05.08.2019; metallographic optical microscope keren okm 173, inv. 101192, 18.10.2018; trinocular metallographic optical microscope optika b-383met, inv. 102037, 08.10.2020; metallurgical optical microscope -b 383met, inv. 101392, 21.12.2018; optical microscope science etd 101 bresser 5806100, inv. 101078, 25.07.2018; stereo optical microscope with integrated camera equipped with 8x lens, inv. 101754, 20.11.2019; digital microscope inspectis c12 with accessories included, inv. 102854, 29.07.2022; milliohmmeter extech dig.380562 ref14397, inv. 101576, 06.09.2019; fluke model 8845a milliohmmeter, inv. 102088, 12.11.2020; automatic laboratory mixer for stainless steel mortar and pestle -542.55lei:tube, inv. 101606, 25.09.2019; mixer with safety door, inv. 102849, 28.07.2022; mixer gm18b471t1-4t6kao 400v, inv. 100942, 23.05.2018; planetary mixer- 60 l, inv. 103404, 27.12. 2022; pulverisette knife mill 15, tool without auger, cutting set, screen,

collection bowl, inv. 101829, 13.12.2019; mill sm 300 220-230v with accessories-rotor with 6 cutting discs, collection hopper 5l, lower screen 10mm, 4mmsi 1mm, inv. 101295, 23.11.2018; flow speed module, sensor and accessories, inv. 102562, 25.11.2021; digital multimeter, inv. 101939, 28.05.2020; digital multimeter dmm6500, inv. 101661, 14.10.2019; keithley multimeter dmm6500 6-1/2 digit, inv. 102798, 13.07.2022; peacktech 3450 multimeter, inv. 101620, 30.09.2019; research multimeter, inv. 10119900, 29.10. 2018; palmsens4 potentiostat /galvanostat/ impedance analyzer, inv. 102033, 16.09.2020; pyranometer smp10-v smart with mounting accessories, inv. 103431, 12.04.2023; preliminary vacuum pump agilent idp-3 sn:my2213s024, inv. 102767, 20.06.2022; ion pump -model vacion plus 300 pump starcellcontroller ion pump-9499.77 RON, inv. 101936, 26.05.2020; camozzi cgc 050 prehensor, inv. 101224, 06.11.2018; profilm 3d optical profilometer, inv. 101590, 12.09.2019; radiation detector geiger gamma scout online, inv. 102564, 25.11.2021; monowave 400 reactor, inv. 103004, 07.10.2022; mini-pro otdr 1310/1550nm 64km cbf12281 fibre optic reflectometer, inv. 103226, 04.11.2022; otdr reflectometer, sm dual wawe, inv. 101782, 29.11.2019; mettler toledo model refracto 30gs reflectometer, inv. 101089, 30.07. 2018; rigol dsa815-spectrum analyzer 1.5ghz, inv. 101533, 27.08.2019; rlc precision meter keysight u1732c, inv. 102659, 21.12.2021; cassy 2 sensor, inv. 102365, 24.08.2021; infrared temperature sensor tw7000, inv. 100884, 02.03. 2018; ponsel nephelometric turbidity sensor, inv. 102473, 21.10.2021; instrument set - sound level meter with data logger 30-130db, 20hz-8khz, with accessories, inv. 102298, 24.06.2021; vacuum filtration system set with 1 post and vacuum pump 25 l/min, inv. 101653, 10.10.2019; automation system for benzoic acid extraction process, inv. 102309, 09.07.2021; microscopy system, inv. 101120, 05.09.2018; integrated system of sensors and biosensors; peripheral device for monitoring and analysis.., inv. 101216, 31.10.2018; integrated sonar water bottom mapping system with remotely controllable robotic boat, inv. 102346, 06.08.2021; optical measurement and analysis system, inv. 101898, 21.04. 2020; portable uv-vis-nir spectrometric system with fiber optics, collimating lens and control, acquisition and data processing software, inv. 101278, 14.11.2018; stationary and portable pen system with appendices: spectrophotometer, alkaline reagent, reagent, inv. 101251, 09.11. 2018; sound level meter with data logger 30 - 130 db 20 hz - 8 khz chauvin arnoux c.a. 1310, inv. 102725, 06.06.2022; sound level meter with data logger sw 1000 22-136 db 0.003 khz-20khz, inv. 102519, 11.11.2021; spectrometer dlpnirnanoevm, inv. 101660, 14.10. 2019; spectrometer edx - ultim max 65, inv. 101747, 18.11.2019; spectrophotometer uv-vis specord 200 plus, inv. 101591, 12.09.2019; laboratory stand for wastewater treatment, inv. 101131, 21.09.2018; wireless weather station davis instruments vantage pro2 plus, inv. 101931, 18.05.2020; weather station (car module allows control of weather characteristics), inv. 101998, 08.07.2020; hot air sterilizer-electronic model "pasteur"-120 liters, inv. 100987, 12.06.2018; stroboscope rt-strobe poket led frequency range 30-300. 000.fpm, inv. 101250, 08.11.2018; stainless steel furnace holder with lower polish -bsr011, inv. 103320, 20.12.2022; optical table holder with active pneumatic insulation 700 mm x 900 mm x 1200 mm, inv. 102846, 27.07. 2022; deuterium-halogen light source+fibre optic cable for deuterium-halogen light source+collimating lens for fibre optic cable for deuterium-halogen light source, inv. 108080, 10.11.2020; thermobalance bts 110, inv. 100926, 17.05. 2018; thermal imaging ir thermometer 380c flir tg267, inv. 102600, 08.12.2021; thermal cycler cole parmer model alpha ac-1 96 well block, inv. 101581, 10.09.2019; superheated steam turbogenerator 1, 2 kw superheated steam turbogenerator accessories, inv. 101393, 28.12.2018; vacuum valve (uhv) on 6" cf flange, inv. 101538, 29.08.2019; ground liquid nitrogen dewar vessel + accessories: norm drain tube pt f; mobile head t5 for l2035; flexible hose ln2l 1, 2m, inv. 101282, 14.11. 2018; dv1mlvcp prod.ametek brookfield digital con-plate vascometer, inv. 101710, 28.10.2019; dv2tlv vascometer,

ametek brookfield, inv. 101749, 19.11.2019; vhi2040-02 portable edge-kit dissolved oxygen instrument, inv. 101526, 06.08. 2019; vibrating sample magnometer -magnetometer with vibrating sample vsm, inv. 102623, 10.12.2021; vibrometer with data logger 0.5-199.9mm/s, voltcraft vbm-100, inv. 102374, 31.08.2021; vpps 2000 sampler 7 days sampling head saldo order airborne particles analyzer pollen , spores vpps sampier, inv. 101183, 15.10.2018; ws510-spectrum- spectrum analysis option for wavesurfer 510, inv. 102802, 19.07.2022; zs1000- active probe 1ghz, 0.9 pf, 1mohm high impdance, inv. 102803, 19.07.2022.

Annex Spaces Sheet contains the UTCN premises classified into teaching, research and administration spaces and the presentation of the chemistry laboratories;
Annex Calc Sheet contains the calculation technique available to the chemistry group;
Annex Resources Sheet contains subscribed resources of scientific literature for research and education;
Annex Soft Sheet contains the list of computer programs in use in the chemistry group;
Annex ERRIS Sheet contains research infrastructure and research service offerings presented to the public via the ERRIS platform;
Annex Groups Sheet contains a selection of UTCN research groups with direct reference to staff involved in the PhD programme in chemistry;
Annex Bib Books contains information on the UTCN book collection;
Annex Bib Magazines contains information on UTCN subscriptions and bilateral journal exchange agreements.

A.3. Quality of human capital

A.3.1. In each field, there are qualified staff with the necessary experience to carry out the doctoral studies programme

In the Technical University of Cluj-Napoca, the filling of teaching positions with teachers having the appropriate skills for the specific objectives of the field of study is done by public competition in accordance with the legal provisions, based on the Regulation on the filling of teaching positions. Selection based on competence criteria applies to both full and associate teaching staff. (HS 1450, HS 652, HS 1005).

A.3.1.1. At least 3 PhD supervisors work in the PhD field and at least 50% of them (but not less than 3) meet the minimum standards of the National Council for the Accreditation of University Degrees, Diplomas and Certificates (CNATDCU) in force at the time of the evaluation, necessary and mandatory for obtaining the habilitation certificate.

Within the Chemistry PhD field there are 3 qualified UTCN full professors (see Table 8) and all of them meet the minimum standards. The information on the degree of fulfillment of the criteria for habilitation in Chemistry is shown in Tab. 11.

Tab. 11. Centralisation of the fulfillment of the conditions for certification in chemistry according to the legislation in force

Criterion	N-max	FIC	FIC_D	FIC_{AP}	FIC_{AC}	Works with at least 13 citations*	Fulfillment	Date of compilation
Checklist for habilitation	50	100.0	70	50	25	13	minimum	sheet of assessment
Jäntschi L	100%	219 %	233 %	308 %	219 %	146%	YES (Sheet J1)	13 Iulie 2022

Rada S	50	251 %	359 %	461 %	922 %	192%	YES (Sheet R1)	14 Mai 2023
Dippong T	100%	267 %	381 %	496 %	669 %	254%	YES(Sheet D1)	2 Mai 2023

*h index is the number of papers with number of citations ≥ h [2]

The degree of achievement of some is all the more impressive because it was achieved in a very short space of time.

In summary, Order of the Minister of National Education and Scientific Research No 6.129/2016 on the approval of the minimum necessary and mandatory standards for the award of teaching titles in higher education, professional degrees in research and development, the quality of doctoral supervisor and the habilitation certificate of 20.12.2016 (OM 6129) provides in Annex No. 4 for the chemistry committee that on the basis of N_max papers organized in descending order of the impact factors of the journals in which they have been published to meet the conditions for habilitation by the general criteria given in Tab. 12.

Tab. 12. Qualification criteria in chemistry in force on 6 May 2023 according to OM 6129/2016

Criteria	**N-max**	**FIC**	**FIC_D**	**FIC_{A_P}**	**FIC_{A_C}**	**h index***
Checklist for habilitation	50	100	70	50	25	13

*h index is the number of papers with number of citations ≥ h [5]

All 3 faculty members are qualified to conduct PhDs (100%). There is also quite a lot of potential for other colleagues in the Physics and Chemistry and Chemistry-Biology departments to meet the qualification requirements soon and become PhD supervisors in chemistry (at least 3).

***A.3.1.2. At least 50% of the doctoral supervisors in the doctoral field evaluated are tenured within IOSUD, employed on a permanent contract of employment**

Tab. 8 contains centralized information on the membership and affiliation of PhD supervisors in chemistry. Annex Sheet J0 contains tenure evidence for Jäntschi L, Annex Sheet R0 contains tenure evidence for Rada S, annex Sheet D0 contains tenure evidence for Dippong T, while annex HS 1654 din 2023 is proof of membership of IOSUD-UTCN for Jäntschi L, annex HS 1652 din 2023 is proof of membership for Rada S, and HS 1653 din 2023 is proof of affiliation for Dippong T.

As shown in Tab. 13, 2 teachers are part of the chemistry group in Cluj-Napoca while the third is part of the chemistry group in Baia Mare.

Tab. 13. Tenured teachers in IOSUD-UTCN qualified in chemistry

Name and surname	**Title**	**Faculty**	**Department**
Jäntschi Lorentz	Prof.	Materials and Environmental Engineering	Physics and Chemistry
Rada Simona	Conf.	Materials and Environmental Engineering	Physics and Chemistry
Dippong Thomas	Conf.	Science	Chemistry and Biology

A.3.1.3. The subjects of the training programme based on advanced university studies related to the field are taught by teachers or researchers who have the status of doctoral/doctoral supervisor, professor/CS I or university lecturer/CS II with proven expertise in the field of the subjects taught or other specialists in the field who meet the standards set by the institution for the above-mentioned teaching and research positions, in accordance with the law.

The PPUA Plan (Plan PPUA) contains the subjects of the advanced degree-based training programme. These are:

÷ Discipline D16-1 is supported by Conf. dr. engr. Giurgiulescu Liviu-Laurențiu, and having the attached discipline sheet (Plan D16-1);
÷ Discipline D16-2 is supported by Conf. dr. engr. Leonard Mihaly Cozmuța, and having the attached discipline sheet (Plan D16-2);
÷ Discipline D16-3 is supported by the PhD supervisor, and with the discipline sheet attached (Plan D16-3);
÷ Discipline D16-4 is supported by Conf. dr. eng. Leonard Mihaly Cozmuța, and having the attached discipline sheet (Plan D16-4);
÷ Discipline D16-5 is supported by Conf. dr. eng. Leonard Mihaly Cozmuța, and having the attached discipline sheet (Plan D16-5);
÷ Discipline D16-6 is supported by Conf. dr. eng. Mariana Pop, having the subject sheet in the attached curriculum (Plan D16-6);

As for the discipline D16-3 (research activity) as indicated in the PPUA Plan, it will be supported by the doctoral supervisor of the doctoral student who follows it. In this respect, the status of PhD supervisor is the necessary and sufficient evidence. Tab. 8 contains centralized proof of habilitation (OM 3570MD pentru Jäntschi L, OM 5633MD for Rada S, OM 4193 for Dippong T), and Senate decisions on affiliation confer the status of doctoral supervisor (annex HS 1654 din 2023 is proof of membership of IOSUD-UTCN for Jäntschi L, annex HS 1652 din 2023 is proof of membership for Rada S, and HS 1653 din 2023 is proof of membership for Dippong T).

A.3.2. Doctoral supervisors in the field carry out an internationally visible scientific activity

The situation of PhD supervisors is presented centrally in Tab. 14.

Tab. 14. Tenured teachers in IOSUD-UTCN qualified in chemistry

Name and surname	CV
Jäntschi Lorentz	CV Jaen
Rada Simona	CV Rada
Dippong Thomas	CV Dipp

As can be seen from their CVs, each of these academics has good teaching and research experience, which has enabled them to become PhD supervisors.

A.3.2.1. At least 50% of the PhD supervisors in the field under evaluation present at least 5 publications indexed by Web of Science or ERIH in journals with an impact factor or other achievements of relevance to the field in question, in which there are contributions of international level that reveal a progress in scientific research-development-innovation in the field under evaluation. The PhD supervisors mentioned have international visibility in the last 5 years, consisting of: membership in scientific committees of international publications and conferences; membership in boards of international professional associations; membership in invited conferences or expert groups held abroad or membership in PhD thesis committees at foreign universities or in co-supervision with a foreign university. For the Arts and Sport Science and Physical Education branches of science, doctoral supervisors will provide evidence of international visibility over the last 5 years through membership of boards of professional associations, membership of organizing committees for international artistic events and competitions, or membership of juries or judging teams for international artistic events or competitions.

Main scientific achievements (minimum 5 publications)

An important dimension in the profile of a PhD supervisor is the filter of their most important achievements. Tab. 15 presents this information centrally.

Tab. 15. Achievements of relevant significance, with contributions at international level, that show progress in research

Specialist	Realizare
Prof. Lorentz Jäntschi (male)	Sheet JC1 M.V. Diudea, I. Gutman, L. Jäntschi. Molecular Topology, Hutington, NY, USA: Nova Science, **2001**, 332 p. The book is co-authored with authors with major impact in the field (I. Gutman - President International Academy of Mathematical Chemistry, M.V. Diudea - President of the European Society of Mathematical Chemistry), and is still today a reference work in the field. It has almost 500 citations in WOS (and in Google)
	Sheet JC2 L. Jäntschi, Integrated Structural Investigations on Biologically Active Compounds, ET/36/MEC/UEFISCSU/3150/11.10.**2005**, 90.33/100 pt., 42 K$. In summary, during the research project and after its completion, more than 50 molecular sets with biological activity were investigated using the methodology developed in the project, "MDF-SARs" available online (http://l.academicdirect.org/Chemistry/SARs/MDF_SARs/). Almost 50 scientific papers have been published as a product of the research, most of them with high international visibility.
	Sheet JC3 S.D. Bolboacă, L. Jäntschi. Pearson versus Spearman, Kendall's Tau correlation analysis on structure-activity relationships of biologic active compounds, Leonardo J. Sci. 5(9): 179-200, **2006.** The paper proves the importance of semi-quantitative coefficients for correlation analysis in classes of biologically active compounds and is still today a reference work in the field. It has over 400 citations in Google.
	Sheet JC4 S.D. Bolboacă, L. Jäntschi. Modeling the property of compounds from structure: statistical methods for models validation. Env. Chem. Lett. 6(3): 175 - 181, **2008**. The paper proves the importance of 3 statistical experiments (Leave-one-€ analysis, € versus test analysis, Correlated correlation analysis) for regression analysis in classes of biologically active compounds. IF_{2021} (Env. Chem. Lett.) = 13.615; It has 26 citations in WOS and 42 citations in Google.
	Sheet JC5 L. Jäntschi. Structure-property relationships for solubility of monosaccharides. Appl. Water Sci. 9(2): 38 - 11p, **2019**. The paper proves the importance of distribution analysis for association analysis in classes of biologically active compounds. IF_{2021}(Appl. Water Sci.) = 5.411; It has 10 citations.
	Sheet JC6 L. Jäntschi. The eigenproblem translated for alignment of molecules. Symmetry 11(8): 1027 - 8p.+4p., **2019**. The communication shows an intrinsic link between molecular alignment and the eigenvalue and eigenvector method. It has 35 citations.
	Sheet JC7 L. Jäntschi. A test detecting the outliers for continuous distributions based on the cumulative distribution function of the data being tested. Symmetry 11(6): 835 - 15p.+7p., **2019**. The paper establishes a new test for the membership of a data series to a distribution. It has 36 citations.
Conf. Simona Rada (female)	Sheet RC1 Rada, S; Culea, M; Neumann, M; Culea, E. Structural role of europium ions in lead-borate glasses inferred from spectroscopic and DFT studies, Chem. Phys. Lett. 460 (1-3) , 196-199, € 20 **2008**. The work carried out in collaboration with a researcher from a prestigious university revealed important structural changes of continuous transition between 2 states occurring in europium oxides in samples prepared by the 'melt quenching' method. Has 91 citations in WOS
	Sheet RC2 Rada, S; Pascuta, P; Culea, M.; Mătieș, V.; Rada, M.; Bârlea, M.; Culea, E. The local structure of europium-lead-borate glass ceramics [29th European Congress on Molecular Spectroscopy], J. Mol. Struct. 924, 89-92, Apr 30 **2009**. The paper, which has passed through two review committees (at the European Molecular Spectroscopy Congress and the Journal of Molecular Structure) presents experimental evidence supported by theoretical modeling on the influence of europium ions on the structural behavior of lead-borate glass ceramics. He has 63 citations in WOS

Specialist	Realizare
	Sheet RC3 Rada, S; Pascuta, P; Boșca, M; Culea, M; Pop, L; Culea, E. Structural properties of the boro-bismuthate glasses containing gadolinium ions. Vib. Spectrosc. 48, 255-258, November 20, **2008**. The paper, passed by two review committees (at the International Conference on Advanced Vibration Spectrometry and the journal Vibrational Spectroscopy) presents experimental evidence supported by theoretical modeling that the glassy lattice becomes tighter with increasing gadolinium ion content in a glassy system containing gadolinium ions. Has 49 citations in WOS.
	Sheet RC4 Rada, S; Culea, M; Culea, E. Toward Modeling Phosphate Tellurate Glasses: The Devitrification and Addition of Gadolinium Ions Behavior, J. Phys. Chem. A 112 (44) , 11251-11255, Nov 6 **2008**. The paper, published by the most prestigious publishing house and professional association in the field of chemistry communicates the authors' results obtained from the study of bottles in the $xGd_2O_3 \cdot (100 - x)[7TeO_2 \cdot 3P_2O_5]$cu $0 \leq x \leq 20$ $\%_{mol}$ system, when it was shown that the addition of gadolinium ions to the host glass matrix leads to an increase in the polymerization of the glass lattice due to the replacement of P-O-P bonds with stronger P-O-Te bonds resulting in improved chemical durability of the glass. It has 48 citations in WOS.
	Sheet RC5 Rada, S; Culea, E. FTIR spectroscopic and DFT theoretical study on structure of europium-phosphate-tellurate glasses and glass ceramics, J. Mol. Struct. 929 (1-3), 141-148, € 16 **2009**. The paper communicates the authors' results obtained from the study of bottles in the $xEu_2O_3 \cdot (100 - x)[7TeO_2 \cdot 3P_2O_5]$cu $0 \leq x \leq 60$ $\%_{mol}$ system, when it was shown that the addition of a high content of Eu2O3 causes the gradual depolymerization of the phosphate chains and the formation of a crystalline phase of $EuPO_4$.
Conf. Thomas Dippong (male)	Sheet DC1 Dippong, T.; Levei, E. A.; Cadar, O. Recent Advances in Synthesis and Applications of Mfe_2O_4 (M = Co, Cu, Mn, Ni, Zn) Nanoparticles. Nanomaterials 11, 6, 1560, **2021**. The review summarizes research on the synthesis and characterization of nanosized ferrites over the past decade. Particular attention has also been paid to identifying new applications for these materials. IF_{2021}(Nanomaterials) = 5.719. It has 80 citations in WOS and is 🏆 WOS Highly Cited Paper.
	Sheet DC2 Influence of Cu^{2+}, Ni^{2+}, and Zn^{2+} Ions Doping on the Structure, Morphology, and Magnetic Properties of Dippong, T.; Levei, E.A.; Deac, I.G.; Neag, E.; Cadar, O. Co-Ferrite Embedded in SiO_2 Matrix Obtained by an Innovative Sol-Gel Route, Nanomaterials 10, 3, 580, **2020**. This paper presents the synthesis of metal doped Co ferrites, $M_{0.2}Co_{0.8}Fe_2O_4$ (M = Cu^{2+}, Ni^{2+} and Zn^{2+}) embedded in the SiO_2 matrix through an innovative sol-gel route. IF_{2021}(Nanomaterials) = 5.719. It has 46 citations in WOS.
	Sheet DC3 Dippong, T.; Levei, E. A.; Cadar, O; Deac, I.G.; Diamandescu, L.; Barbu-Tudoran, L. Effect of nickel content on structural, morphological and magnetic properties of $Ni_xCo_{1-x}Fe_2O_4/SiO_2$ nanocomposites. J. Alloy. Compd., 786, 330-340, May 25 **2019**. The paper characterizes a series of nanocomposites having the general formula $Ni_xCo_{1-x}Fe2O_4/SiO_2$ (x = 0, 0.25, 0.50, 0.75 and 1.00). IF_{2021}(J. Alloy. Compd.) = 6.371. It has 42 citations in WOS.
	Sheet DC4 Dippong, T.; Levei, E. A.; Cadar, O. Formation, Structure and Magnetic Properties of $Mfe_2O4@SiO_2$ (M = Co, Mn, Zn, Ni, Cu) Nanocomposites. Materials 14, 5, 1139, Mar **2021**. The formation, structure and thermal and magnetic properties of nanocomposites $Mfe_2O_4@SiO_2$ (M = Co, Mn, Zn, Ni, Cu) (60% Mfe_2O4/40% SiO_2) were studied, produced by a modified sol-gel method followed by annealing at 300, 600, 900 and 1200 °C. IF_{2021} (Materials) = 3.748. It has 41 citations in WOS.

Specialist	Realizare
	Sheet DC5 Dippong, T.; Toloman, D.; Levei, E.A.; Cadar, O.; Mesaros, A. A possible formation mechanism and photocatalytic properties of $CoFe_2O_4$/PVA-SiO_2 nanocomposites. Thermochim. Acta, 666, 103-115, Aug 10 **2018**. This paper presents the synthesis of nanocrystallites of $CoFe_2O_4$ embedded in the hybrid matrix PVA-SiO_2 by a modified sol-gel method. IF_{2021} (Thermochim. Acta) = 3.378. It has 38 citations in WOS.

Visibility through membership of various committees

International representation is another dimension in the doctoral leadership component. In Tab. 16 information on international visibility is presented centrally. In the appendices the components of international visibility are shown grouped by individual: Sheet JM (Jäntschi), Sheet RM (Rada) and Sheet DM (Dippong).

Tab. 16. Components of international visibility (membership)

Component	Visibility
Member of scientific committees of international publications and conferences	**Prof. Lorentz Jäntschi:** Leonardo Journal of Sciences (2002-2018); Leonardo Electronic Journal of Practices and Technologies (2002 - 2018); Notulae Botanicae Horti Agrobotanici Cluj-Napoca (2010 - prezent); Notulae Scientia Biologicae (2010 - prezent); Open Agriculture (2019 - prezent); Symmetry (2019 - prezent); Mathematics (2020 - prezent); Foundations (2021 - prezent) **Conf. Simona Rada:** Inorganics (2022 - prezent) **Conf. Thomas Dippong:** Guest Editor for Nanomaterials (2021-2023); International Journal of Molecular Sciences (2022-2023); International Journal of Environmental Research and Public Health (2023); Materials (2022-2023)
Member of boards of international professional associations	**Prof. Lorentz Jäntschi:** European Society of Mathematical Chemistry (2007 - 2019); Horticultural and Forestry Society of Transylvania (2011 - 2021) **Conf. Simona Rada:** CODECS: Convergent Distributed Environment for Computational Spectroscopy (2022 -prezent)
Invited to conferences or expert groups held abroad	**Prof. Lorentz Jäntschi:** ES1002 "WIRE", COST Workshop; March 22-24; Nice, France **Conf. Thomas Dippong:** 20–23 June 2023, 3rd Journal of Thermal Analysis and Calorimetry Conference and 9th V4 (Joint Czech-Hungarian-Polish-Slovakian) Thermoanalytical Conference
Member of committees for the defense of doctoral theses at foreign universities or in cotutelle with a foreign university	**Prof. Lorentz Jäntschi:** Propagation by micropropagation of the common walnut (Juglans reg. L.) and its importance in the improvement and culture of the species (2012, drd. Rodica GOTEA, Prof. Dr. Radu SESTRAŞ Prof. Dr. Kourosh VAHDATI).

***A.3.2.2. At least 50% of the doctoral supervisors assigned to a field of doctoral studies continue to be scientifically active, obtaining at least 25% of the score required by the CNATDCU minimum standards in place at the time of the evaluation, necessary and mandatory for obtaining the habilitation certificate, based on the scientific results of the last 5 years.**

A relevant headline regarding the work of PhD supervisors is their activity in the last period of time. From this point of view Tab. 17 contains the degree of fulfillment of 25% of the enabling criteria with publications from the last 5 years only.

Tab. 17. Meeting 25% of the enabling criteria with publications from 2018-2022

Criteria	N-max	FIC	FIC_D	FIC_{AP}	FIC_{AC}	Papers with at least 13/4 citations*	Fulfillment	Data

Habilitation checklist	50	100	70	50	25	13	with 2018-2022 papers	
25% of checklist	12.5	25	17.5	12.5	6.25	13/4 = 3.25	a 25% of checklist	of verification
Jäntschi	9	27	27	27	27	7	Da (Sheet J2)	13 April 2023
Rada	12	53	53	35	38	25/6	Da (Sheet R2)	15 April 2023
Dippong	12	78	78	78	66	12	Da (Sheet D2)	13 April 2023

*h index is the number of papers with number of citations ≥ h [5]

A common indicator lately is the Hirsh index and comparisons are frequently made in Google's open source system because it's easily verifiable information. The total number of citations and the total Hirsh index is a clear indicator of international visibility. Tab. 18 contains this indicator.

Tab. 18. Total number of citations and Hirsh index in Google Scholar as of 11 April 2023

Indicator	L. Jäntschi	S. Rada	T. Dippong
Citations for all activity	3694	2499	1815
Hirsh for all the activity	26	28	35
Citations in the last 5 years	1369	1103	1625
Hirsh for the last 5 years	15	17	31

To summarize, in the annexes Sheet J1 contains the criteria check sheet Jäntschi L, Sheet R1 contains the Rada S criteria check sheet, and Sheet D1 contains the Dippong T criteria check sheet, all for the whole activity. The CV sheets contain the Curriculum vitae, CV Jaen contains CV Jäntschi Lorentz, CV Rada contains CV Rada Simona, CV Dipp contains CV Dippong Thomas. Sheet JC1, Sheet JC2, Sheet JC3, Sheet JC4, Sheet JC5, Sheet JC6, Sheet JC 7 contain the contributions considered relevant to Jäntschi L. Sheet RC1, Sheet RC2, Sheet RC3, Sheet RC4, Sheet RC5 contain contributions considered relevant to Rada S. Sheet DC1, Sheet DC2, Sheet DC3, Sheet DC4, Sheet DC5 contains contributions considered relevant to Dippong T. Sheet JM contains international visibility for L. Jäntschi, Sheet RM contains international visibility for S. Rada, and Sheet DM contains international visibility for T. Dippong. Sheet J2 contains verification of fulfillment of the 25% criterion within the last 5 years for L. Jäntschi, Sheet R2 contains verification of compliance with the 25% criterion in the last 5 years for S. Rada, Sheet D2 contains verification that the 25% criterion has been met in the last 5 years for T. Dippong.

Domain B. Educational effectiveness

B.1. Number, quality, and diversity of candidates who applied for admission

B.1.2. Candidates admitted to doctoral studies demonstrate academic, research, and professional performance

***B.1.2.1. Admission to the PhD programmes is based on selection criteria that include: the academic, research and professional performance of the candidates, an interest in scientific or artistic/sports research, publications in the field and a proposed research topic. An interview with the applicant is a compulsory part of the admission procedure**

Article 27 of the Regulation on the organization of admission to the cycle of doctoral studies at the Technical University of Cluj - Napoca (HS 1467), it is specified that "Art. 27(1) Regardless of the field, the competition for admission to a doctorate consists of at least two tests:

÷ An interview in which the candidate's educational background and scientific/professional interests, research skills and the proposed topic for the PhD thesis are analyzed;
÷ A language proficiency test for an international language (...)".

Thus, admission to the UTCN Doctoral School includes a *mandatory interview with the candidates*.

Admission to doctoral degree programmes is based on selection criteria that include:

÷ Previous professional performance of candidates to be discussed during the admission interview (HS 1467 art. 27)
÷ Candidates' interest in scientific or artistic/sports research: acc. to art. 18 in HS 1467 the applicant's CV is mentioned among the documents required for application. On the basis of the CV, the applicant's interest in research is established and this is also developed during the admission interview.
÷ Publications in the field: the documents required for registration also contain a list of scientific papers published or communicated to demonstrate the applicant's interest in scientific research (HS 1467, art. 18).
÷ The research topic proposal: this is discussed and analyzed by the admission committee and in the minutes of the admission exam, the committee records that it "examined the candidate's file, who presented his/her work and the topic he/she wishes to develop in the doctoral thesis and evaluated the result of the competition examination". (HS 1467 art. 27(1)).

Annex B121 contains elements that support the academic, research and professional performance of successful candidates: Centralizer on admission selection criteria; Admission regulations; Theses defended at UTCN from 1960 to 2016 in support of the number, quality and diversity of candidates who applied to the admission competition and completed their PhD studies at UTCN.

B.2. The content of doctoral degree programmes

B.2.1. The advanced undergraduate-based training programme is suitable for improving the research skills of doctoral students and strengthening ethical behavior in science.

B.2.1.1. The advanced undergraduate-based training programme comprises a minimum of 3 disciplines relevant to the scientific research training of doctoral students, of which at least one discipline is devoted to the in-depth study of research methodology and/or statistical data processing.

The curriculum of the advanced undergraduate training programme - Chemistry covers 3 years and comprises two compulsory components according to Art. 46 and Art. 47 of the Institutional Regulations (HS 1235): (1) Advanced Degree-based Training Programme and (2) Individual scientific research programme (Plan PPUA). Plan PPUA contains the advanced undergraduate-based training programme; subject D16-2 is for the in-depth study of statistical data processing (the subject is entitled 'Statistical processing of experimental data').

The advanced undergraduate-based training programme includes disciplines relevant to the training of PhD students in scientific research. Among the specific subjects we mention two subjects included in the curriculum of the Master specialization in Chemistry (subjects D16-4 "Electrochemical analysis methods" and D16-5 "Analysis by atomic and molecular spectrometry") and one needle included in the curriculum of the Master specialization in Materials Engineering (D16-6 "Technological properties of materials"), which have in structure both theoretical part and applied activities (laboratory). The research activity, also foreseen in the Curriculum, contributes essentially to the development of the research skills of the PhD students. In order to support PhD students in the processing of experimental data, the Chemistry PhD curriculum provides for the discipline Statistical Processing of Experimental Data. The number of transferable study credits

accumulated by the doctoral student during the training programme based on advanced undergraduate studies is 30 (art. 34(1) in HS 1235).

B.2.1.2. There is at least one subject devoted to ethics in scientific research and intellectual property or well-defined themes on these topics within a subject taught in the training programme.

The curriculum of the PPUA for the field of Chemistry includes a compulsory subject dedicated to ethics in scientific research and intellectual property entitled Ethics and Academic Integrity (Subject D16-1, in which the ethical aspects of scientific research and intellectual property are addressed. Annex Plan PPUA contains the advanced undergraduate-based training programme and D16-1 is dedicated to ethics in scientific research and intellectual property.

To ensure a coherent pathway for the PhD student, Plan PPUA of the PhD in Chemistry requires 5 oral presentations in front of the PhD supervisor and the supervision committee as regulated in the Institutional Regulations (HS 1235 art. 52(1)): a scientific research project (year I, sem. I), a progress report in year I (sem. II), two progress reports in year II (sem. I and sem. II), a progress report in year III (sem. I), each one being awarded 30 transferable credits according to the Institutional Regulations (HS 1235 art. 34(2)). The scientific research project (first semester, first year) is established by the doctoral student together with the supervisor and must include the general objective and specific objectives of the doctoral thesis, research methodology, risk assessment and alternative solutions, estimated timetable of research activities (Gantt chart), according to the Institutional Regulations (HS 1235 art. 50(2)).

B.2.1.3. IOSUD devised the mechanisms to ensure that the advanced undergraduate-based training programme for the assessed field addresses "outcomes of learning", by specifying the knowledge, skills and responsibility and autonomy that doctoral students should acquire after completing each discipline or through research activities (or what they need to know, understand and be able to do, in accordance with the provisions of the Methodology for the registration and recording of higher education qualifications in the National Register of Higher Education Qualifications (RNCIS), approved by the Order of the Minister of National Education 3. 475/2017, with subsequent amendments and additions).

The Institutional Regulation responds to the above criterion in Section 4.1. *Purpose and competences provided by doctoral degree programmes by stating in Art. 44 and Art. 45(1,2) that doctoral degree programmes are a form of advanced learning through research that provides for the formation of professional, cognitive and research competences in specialized fields, as well as transversal competences* (HS 1235 art. 44 and art. 45(1,2)).

The disciplines of *Ethics and Academic Integrity* and *Statistical Processing of Experimental Data* in the Chemistry PhD Curriculum (Plan PPUA) provides transversal competences and specialist subjects ensure the acquisition of professional knowledge (*Electrochemical analysis methods, Analysis by atomic and molecular spectrometry, Technological properties of materials*). The subject sheets mention the professional and transversal competences specific to each subject which derive from the general and specific objectives of the subjects (Plan PPUA).

The subjects of the Advanced Degree Programme in Chemistry are coordinated by teachers who have proven expertise in the field of the coordinated subjects.

The mentoring committees will check/guide/correct/support the acquisition of knowledge, skills, responsibility and autonomy by doctoral students through the analysis of the scientific research project, progress reports and associated minutes. (HS 1235 Section 3.3. - Supervision of work in doctoral degree programmes).

Annex Plan PPUA contains the subjects of the advanced degree-based training programme D16-4, D16-5, and D16-6 which have a common structure in the curriculum of 2 hours of lectures and 2 hours of practical applications per week, while the discipline of ethics (D16-1) has one class per week and Statistics

(Subject D16-2) one hour lecture and one hour seminar. The discipline of research activity is linked to the doctoral topic and the curriculum is structured in the Annex D16-3.

For each subject attended in the Advanced Degree Programme, the doctoral student receives a certificate of attendance issued by the course holder and countersigned by the PhD supervisor/principal supervisor. All certificates of participation shall be submitted by the PhD student to the IOSUD-UTCN secretariat to prove that the obligations of the advanced degree-based training programme have been fulfilled (Art. 48(1) in HS 1235). The study subjects included in the Advanced University Studies-based Training Programme have analytical programmes (subject sheets) in which are specified: the name of the subject, the number of credits allocated, the distribution of hours for the course and practical activities/seminar, the objectives, the concordance between the objectives of the subject and the objectives of the specialization, the general competences acquired after completing the subject, the subject matter of the course and of the practical work/seminar, the hours of individual study for doctoral students, the minimum bibliography, and the assessment methods (see the PPUA Plan and D16-1, D16-2, D16-3, D16-4, D16-5, and D16-6).

Domain C. Quality Management

C.1. The existence and regular operation of the internal quality assurance system

C.1.1. The institutional framework is in place and relevant internal quality assurance policies and procedures are applied

C.1.1.1. The doctoral school to which the doctoral field of study belongs demonstrates that it constantly carries out its internal quality assessment and assurance process in accordance with a procedure developed and applied at IOSUD level, among the criteria assessed being mandatory: a) the scientific work of the doctoral supervisors; b) the infrastructure and logistics necessary for the conduct of research; c) the regulations and procedures on the basis of which doctoral studies are organized; d) the scientific work of the doctoral students; e) the training programme based on advanced university studies of the doctoral students; f) the social and academic support services (including participation in various events, publication of articles, etc.); g) the support services provided to the doctoral students. (f) the provision of support (including participation in various events, publication of articles, etc.) and counseling services for doctoral students.

The quality of undergraduate, master's and doctoral studies and research activities and service to the community are at the heart of the strategic concerns of the Technical University of Cluj-Napoca, as stated in the Strategic Plan 2020-2024 (HS 1253). In order to achieve these goals, the following quality structures operate within the institution:

÷ *Committee for Quality Assessment and Assurance* (CEAC) which monitors and coordinates the implementation of the quality function at institutional level (http://dac.utcluj.ro/CEAC.html);
÷ *Quality Assurance Bureau*, responsible for coordinating the quality assurance process at educational level and assisting management in making strategic quality decisions (http://dac.utcluj.ro);
÷ *Office of Academic Ethics and Integrity (BEIA*) (HS 1407) with tasks related to the digitisation and verification of all doctoral theses, as well as the training of ethics and integrity trainers, including the operation of anti-plagiarism software;
÷ *Quality managers* at faculty and Doctoral School level, responsible for implementation.

Each of these roles operates in accordance with approved organizational and operational regulations and bases its work on the UTCN Quality Assurance Code. Within the IOSUD, quality-related duties are carried

out by the CSUD Director. In HCA 120-11 the system of criteria, standards and performance indicators used in the self-assessment of the UTCN doctoral school and IOSUD-UTCN in accordance with OM 3200/2020 published in MO no. 132 of 19.02.2020 is presented, while the content of the doctoral degree programmes is evaluated periodically, every 5 years, in order to ensure the continuity of the fulfillment of level 8 qualification according to the National Qualifications Framework (HCA 120-12) and self-assessment in IOSUD has two further components, assessment at the field of study level (HCA 120-10), and at doctoral school level (HCA 112-9). The last evaluation process took place in 2021 and also involved the completion of Self-Assessment Sheets by PhD supervisors and PhD students. The results were presented publicly in the form of a report (see Raport de auto-evaluare 2021). The current general framework setting out the criteria and indicators for self-assessment of IOSUD-UTCN activity and the assignment of responsibilities for the self-assessment process and report aims at:

÷ the scientific activity of doctoral supervisors
÷ the infrastructure and logistics needed to carry out the research activity;
÷ the procedures and subsequent rules on the basis of which doctoral studies are organized.

Updated versions of the METHODOLOGY for self-assessment of the activity of the UTCN Doctoral School have been implemented at the level of the fields within the Doctoral School, which aim at:

÷ the scientific activity of PhD supervisors;
÷ the infrastructure and logistics needed to carry out the research activity;
÷ the procedures and subsequent rules on the basis of which doctoral studies are organized;
÷ scientific activity of doctoral students;
÷ advanced degree-based training programme for doctoral students.

The evaluation is carried out periodically according to the regulations in place.

The methodology in the version approved by the CA on 15.01.2019 was applied between November 2018 and December 2019, generating specific centralisers at the level of the PhD field of study. The methodology was subsequently updated and implemented from 19 February to 5 March 2021, with the results available online (http://evaluare-institutionala.utcluj.ro).

The 2019 evaluation process consisted of PhD supervisors completing the 2018 PhD Supervisor Self-Assessment Sheet and their PhD students completing the 2018 PhD Student Self-Assessment Sheet. The sheets have been developed according to the system of criteria, standards and performance indicators used in the accreditation and periodic evaluation of doctoral study areas (according to O.M. no. 5403/2018 on the establishment of the Methodology for the evaluation of doctoral studies and the systems of criteria, standards and performance indicators used in the evaluation) with an emphasis on the reporting of scientific work (self-evaluation forms are presented in the Annexes).

A committee was established for each field, which carried out the verification of the PhD supervisors' files (by HCA 97 from 20.11.2018). Officials appointed through HCA 98 from 20.11.2018 have carried out the collection and centralisation of documents *Questionnaire* (RAV18), developing a *Centraliser* for each area (REV18).

There was also the application of a *Questionnaire* (RAD19) between 28.01.2019-01.02.2019 for doctoral trainees in all fields and resulting in a *Centraliser* (RAD19).

The 2021 evaluation process consisted of the completion by PhD supervisors of the *PhD Supervisor self-assessment sheet 2021* (RAV21) and in the completion by their PhD students of the *PhD Student self-assessment form 2021* (RAD21). The sheets have been developed according to the system of criteria, standards and performance indicators used in the accreditation and periodic evaluation of doctoral study areas (according to OM 3200/2020 concerning the approval of the Methodology for the evaluation of doctoral studies and of the systems of criteria, standards and performance indicators used in the evaluation),

with a focus on the reporting of scientific work. A committee was established for each field, which carried out the verification of the PhD supervisors' files (by Hotărârea CA no. 21 din 16.02.2021). Officials appointed by Hotărârea CA no. 22 din 16.02.2021 have carried out the collection and centralisation of documents, drawing up a *Centraliser* (REV21) per domain. A questionnaire was also administered between 19.02.2021-26.02.2021 to doctoral trainees in all fields (RED21).

Comparing the results of the two questionnaires shows an increase in the quality of doctoral study programmes and activities within the UTCN Doctoral School. 71.1% (2021) compared to 64.7% (2019) of the doctoral students who responded to the questionnaire are very satisfied with the extent to which they were supported by UTCN staff in their first year of study for integration into the specific activities of doctoral studies.

In question 2 of the questionnaire regarding the disciplines in the advanced degree-based training programme, 61.5% (2021) compared to 52.1% (2019) felt that the disciplines in the PPUA provided them at a very high level with the knowledge and skills needed to carry out doctoral research. The majority of PhD students (65.6%-2021 / 61.6%-2019) consider that they are very well informed regarding aspects of research methodology and statistical data processing (question 8). 75.2%-2021 vs. 69.2%-2019 PhD students consider that they are very well informed regarding the respect of scientific and academic ethics (question 9).

Questions 3, 4 and 7 were about the level of satisfaction with the involvement of the PhD coordinator and the mentoring committee in terms of mentoring the PhD student and monitoring the PhD student's scientific work, showing similar results of the results of the two questionnaires (79.4%-2021/79.8%-2019 for question 3, 78.4%-2021/72.9%-2019 for question 4, 75.7%-2021/76%-2019 for question 7).

Question 10 asks for feedback on how they have been informed and checked about the procedures under which doctoral studies are organized.

Questions 5 and 6 of the questionnaire checked the involvement of the PhD supervisor and the faculty where the PhD student is working in providing research conditions:

÷ for 2019, PhD students consider that they had good (56 - 19.2%) and very good (200 - 68.5%) involvement from the scientific supervisor and faculty in providing research conditions for 2019

÷ for the year 2021, PhD students consider that they had good (37 - 17%) and very good (152 - 69.7%) involvement from the scientific supervisor and faculty in providing research conditions.

The mechanisms for reviewing the content of doctoral degree programmes are regulated by the Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN (HCA68-5) art. 9, alin. (11), (12) and by the Operational Procedure on ensuring the achievement of level 8 qualifications according to the National Qualifications Framework (CNC) and the European Qualifications Framework (EQF), HCA 120-12 which verifies the correspondence of the content of doctoral degree programmes with level 8 qualifications according to the National Qualifications Framework.

With the appearance of the new OM no. 3651 from 12 April 2021 concerning the approval of the Methodology for the evaluation of doctoral studies and the systems of criteria, standards and performance indicators used in the evaluation, published in the Official Gazette No 414 of 20 April 2021, at the proposal of the Director of CSUD, the updating of the self-evaluation Methodologies was initiated according to the new specifications that have appeared.

Procedures developed or measures taken at IOSUD-UTCN level to date regarding the provision of services related to the teaching and research process:

÷ *counselling services* Methodology regarding the organization and functioning of the Career Counseling and Guidance Center (CCOC) of the Technical University of Cluj-Napoca, approved by HSU 379/20.02.2012 states in Art. 6, (b) that the work of the CCOC is geared towards reducing drop-out. Within the Career Counseling and Guidance Centre, university students, regardless of their degree cycle,

benefit free of charge from psychological counseling services, which are aimed at anyone who wishes to better understand the situations and life problems they encounter and which can provide the necessary support to overcome some obstacles, including dropout problems (http://utcluj.ro/ococ/; http://escouniv.ro/consiliere-online)

÷ *social support* According to the Regulation of organization and functioning of UTCN student dormitories (Dormitories Sheet), PhD students are provided with accommodation on UTCN premises. Art. 16(2) of the Institutional Regulations (HS 1235) highlights special cases taken into account in accommodation: social cases, specific medical situations, student families, etc.

IOSUD-UTCN has a policy of fee reductions for disadvantaged students. The University offers fee reductions of 50% - 100%, exemption from payment of dormitory fees, free meal card (Annex C.1.1.1. HCA 100 2020) for doctoral students from foster care and orphan students.

÷ *academic support* (including participation in various events, publication of articles, etc.) Doctoral students benefit from academic support offered within IOSUD-UTCN by different services or departments. On the IOSUD-UTCN website, managed by the IOSUD Secretariat in collaboration with the UTCN Doctoral School, announcements are posted about various programmes/fellowships/publications that may be of interest to them http://iosud.utcluj.ro/burse.html

The IOSUD website also displays information on projects aimed at doctoral students or postdoctoral researchers, such as the Antredoc project (http://antredoc.utcluj.ro). Furthermore, by HS 1296 the establishment of spin-offs has been ruled.

Doctoral students receive financial and academic support in terms of publication in various ways such as:

÷ HCA - 15 / 26.01.2016 - on the settlement of international travel;
÷ HCA no. 76 din 6 septembrie 2016 awarding scholarships from own income;
÷ HCA 21 05 02 2019 granturi site grants to support published work;
÷ HCA no. 135 din 15.12.2020 - grants to support scientific research;
÷ HCA no. 139 din 14.12.2021 actualizată - supporting excellence in scientific research;
÷ HCA no. 11 din 25.01.2023 - supporting excellence in scientific research - for the year 2023.

In the UTCN 2020-2024 Strategic Plan (HS 1253), the directions of action, outcome indicators and measures proposed for doctoral, postdoctoral and postgraduate education can be observed, among which we mention: increasing financial support to doctoral/postdoctoral researchers by accessing new projects within the *Human Capital Operational Programme 2021-2027*, and/or through scholarships of excellence awarded from own income or private scholarships; granting support grants in the first three years after employment in the university to young people completing doctoral/postdoctoral studies; encouraging doctoral students to participate in prestigious scientific events, to publish in BDI-indexed journals, by awarding support grants, in order to meet the criteria for thesis support and increase the completion rate; organizing an annual international conference of the Doctoral School, built around the partner universities of the Eut+ network. https://www.utcluj.ro/media/decisions/2020/10/26/Plan_Strategic_UTCN.pdf

The scientific work of doctoral supervisors and doctoral students was evaluated through the regular application of the Self-Assessment Sheets:

÷ Centralizer for teachers (REV18);
÷ Centralizer doctoral students (RAD19);
÷ Centralizer for teachers (REV21);
÷ Centralizer doctoral students (RED21).

Feedback on the advanced degree-based training programme for PhD students, monitoring of the implementation of the regulations and procedures on the basis of which doctoral studies are organized, and feedback on the infrastructure and logistics required to carry out the research work were obtained through

the application of the Feedback Collection Questionnaire from PhD students in 2019 and 2021. The content of doctoral degree programmes as corresponding to qualification level 8 according to the National Qualifications Framework is verified by the Operational Procedure on ensuring the fulfillment of qualification level 8 according to the National Qualifications Framework and the European Qualifications Framework. (HCA 120-12). There are various procedures and measures taken at IOSUD-UTCN level whereby social and academic support (including participation in various events, publication of articles, etc.) and counseling services are made available to doctoral students. The methodologies for internal evaluation and monitoring of the activities of the doctoral schools are regularly updated according to new legislative provisions.

To summarize, the IOSUD-UTCN evaluation system consists of Institution Rulebook, Rulebook of the doctoral school, and related documents contained centrally in SD RMH. IOSUD-UTCN last evaluated in 2021 (see Self-assessment report) which resulted in the maintenance of accreditation for all 14 doctoral fields (see OM 5500). The scientific work of PhD supervisors is evaluated simultaneously with the evaluation of their field on the basis of the self-assessment form presented in HCA 120-10. The infrastructure and logistics needed to carry out the research activity are included in PO 04 IOSUD (ensuring conditions for level 8 qualification), AM Sheet (mobility agreements), Spaces Sheet (contains UTCN premises for teaching, research and administration and chemistry laboratories), Sheet Calc (computing technology available to the chemistry group), Resources Sheet (subscribed resources of scientific literature for research and education), Sheet Soft (list of computer programs in use in the chemistry group), Sheet ERRIS (research infrastructure and research service offerings presented through the ERRIS platform), Groups Sheet (selection of UTCN research groups with direct reference to staff involved in the PhD programme in chemistry), Bib Books (information on the UTCN book collection), Bib Reviste (Information on UTCN subscriptions and bilateral journal exchange agreements). The regulations and procedures under which doctoral studies are organized are contained in Institutional Rulebook, Doctoral school rulebook, and related documents centralized in SD RMH. The scientific activity of doctoral students during their internship is regulated by the regulations on the IOSUD website at - http://iosud.utcluj.ro/stagiul-de-doctorat.html, on admission by the admission regulations (see HS 1467) and on completion of studies by the corresponding regulations (HCA 140-14). The training programme based on advanced university studies is governed by Article 47 in HS 1235 and its implementation for the PhD programme in chemistry is given in Plan PPUA. UTCN provides social support (e.g. accommodation, see Dormitories Sheet, tax reductions for social cases, see HCA 103-3), academic (research grants, see HCA 03-02), for performance (see HCA 110-2) dissemination (see Dissemination Plan) and counseling (see http://consiliere.utcluj.ro). There is a service specialized in carrying out evaluation procedures and internal quality assurance (see http://dac.utcluj.ro), and HS 1407.

***C.1.1.2. During the doctoral training period, evaluation mechanisms are implemented to identify the needs as well as the overall level of satisfaction of doctoral students with the doctoral programme in order to continuously improve the academic and administrative processes. Following the analysis of the results obtained, a plan of measures is developed and implemented**

Institutional Regulation (HS 1235) at *Section 7.1. Planning, maintaining control and continuous improvement of doctoral training in UTCN* - Art. 73(1) mentions that CSUD *identifies critical processes for quality assurance in UTCN doctoral activity and collaborates with the UTCN quality assurance department in the development and implementation of procedures necessary to maintain control and continuous improvement of these processes.* The immediate needs of doctoral students are identified through meetings with the doctoral coordinator and members of the mentoring committee.

Also, during the doctoral training period, evaluation mechanisms are implemented to identify the needs/satisfaction level of doctoral students with the degree programme. These consist of the completion of questionnaires by all doctoral students. Feedback on the advanced undergraduate-based training program

of PhD students, monitoring of the implementation of regulations and procedures on the basis of which PhD studies are organized and feedback on the infrastructure and logistics necessary for conducting research work were obtained by applying the Feedback Collection Questionnaire from PhD students in 2019 and 2021.

Comparing the results of the two questionnaires (Centralizing Questionnaire for PhD students 2019 (RAD19) vs. Centralizing Questionnaire for PhD students 2021 (RED21)) an increase in quality can be observed in terms of doctoral study programmes and activities within the UTCN Doctoral School. 71.1% (2021) compared to 64.7% (2019) of doctoral students responding to the questionnaire are very satisfied with the extent to which they were supported by UTCN staff during their first year of study in integrating into the activities specific to doctoral studies.

In question 2 of the questionnaire regarding the disciplines in the advanced degree-based training programme, 61.5% (2021) compared to 52.1% (2019) felt that the disciplines in the PPUA provided them with the knowledge and skills needed to carry out doctoral research at a very high level. The majority of PhD students (65.6%-2021 / 61.6%-2019) consider that they are very well informed in terms of research methodology and statistical data processing aspects (question 8). 75.2%-2021 versus 69.2%-2019 PhD students consider that they are very well informed in terms of respect for scientific and academic ethics (question 9).

Questions 3, 4 and 7 were about the level of satisfaction with the involvement of the PhD coordinator and the mentoring committee in terms of mentoring the PhD student and monitoring the PhD student's scientific work, showing similar results of the results of the two questionnaires (79.4%-2021/79.8%-2019 for question 3, 78.4%-2021/72.9%-2019 for question 4, 75.7%-2021/76%-2019 for question 7).

Question 10 asks for feedback on how they have been informed and checked about the procedures by which doctoral studies are organized.

Questions 5 and 6 of the questionnaire checked the involvement of the doctoral supervisor and the faculty where the doctoral student is working in providing research conditions:

- for 2019 PhD students consider that they had good (56 - 19.2%) and very good (200 - 68.5%) involvement from the scientific supervisor and faculty in providing research conditions for 2019;
- for the year 2021, PhD students consider that they had good (37 - 17%) and very good (152 - 69.7%) involvement from the scientific supervisor and faculty in providing research conditions.

The results obtained have been processed and expressed in the form of a report which has contributed to the development of operational plans that list team leaders, results, measurable impact indicators and duration, aimed at improving academic and administrative regulations.

Annex C112 contains:

- Personal data questionnaire;
- Rector's Decision 922/2021 appointing PhD candidate to CSUD;
- Self-Assessment Form for PhD students model 2021;
- Student Evaluators Report 2018;
- PhD students report for 2019;
- PhD students report for 2021.

C.2. The transparency of information and accessibility of learning resources

C.2.1. The information of interest for doctoral students, future candidates and information of public interest is available for consultation in electronic format.

C.2.1.1. IOSUD publishes on the website of the higher education institution, in compliance with the regulations in force on data protection, information such as: a) doctoral school regulations; b) admission

regulations; c) doctoral study contract; d) regulations for the completion of studies, including the procedure for the public defense of the thesis; e) the content of training programmes based on advanced university studies; f) the academic and scientific profile, thematic areas/research themes of the doctoral supervisors in the field, as well as their institutional contact details; g) list of doctoral candidates in the field with basic information (year of registration, supervisor); h) information on the standards for the preparation of the doctoral thesis; i) links to abstracts of doctoral theses to be publicly defended, as well as the date, time, place where they will be defended, at least 20 days before the defense.

The IOSUD-UTCN web platform http://iosud.utcluj.ro/ is addressed to PhD students of the Technical University of Cluj Napoca. Through it, information is published about:
Rulebook of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN;
Rulebook for the organization of the admission in the cycle of doctoral studies at the Technical University of Cluj-Napoca;
Doctoral studies contract.

Institutional Regulation (HS 1235) includes information on the completion of studies in Chapter 5, and *Procedure for completing doctoral studies at IOSUD-UTC-N* is the procedure for the public defense of the thesis. The procedure can be found on the website: http://iosud.utcluj.ro/regulamente.html
The page dedicated to the doctoral school is: http://iosud.utcluj.ro/scoli-doctorale-146.html

It can be used to access the pages of the Doctoral Programme Coordinating Councils (https://iosud.utcluj.ro/scoli-doctorale-146.html), where information can be found on:

÷ the content of study programmes;
÷ the scientific profile and thematic areas/research topics of the PhD supervisors in the school, as well as their institutional contact details;
÷ list of PhD students in the school with basic information (year of registration; supervisor);
÷ information about the standards for writing a doctoral thesis;
÷ links to the abstracts of doctoral theses to be publicly defended, as well as the date, time and place where they will be defended, at least 20 days before the defense

The addresses of the websites of the Coordination Councils are given in Tab. 19.

Tab. 19. Websites of the Coordinating Councils of the doctoral programmes

Doctoral Programmes Coordination Council	PhD fields	Information
Architecture and Urbanism	Architecture	https://fau.utcluj.ro/scoala-doctorala-de-arhitectura-si-urbanism.html
Automation and Computers	Systems Engineering Computers and Information Technology	https://ac.utcluj.ro/scoala-doctorala.html
Construction and installations	Civil and plant engineering	https://constructii.utcluj.ro/scoala-doctorala.html
Electronics, telecommunications and information technology	Electronics engineering, telecommunications and information technology	https://etti.utcluj.ro/scoala-doctorala.html
Materials and environmental engineering	Materials engineering Environmental engineering	https://sdimm.utcluj.ro/
Electrical engineering	Electrical engineering	https://ie.utcluj.ro/scoala-doctorala-89.html
Industrial Engineering and Management	Industrial engineering Engineering and management	https://cm.utcluj.ro/scoala-doctorala.html

Doctoral Programmes Coordination Council	PhD fields	Information
Mechanical and mechatronic engineering	Mechanical engineering	https://mecanica.utcluj.ro/scoala-doctorala.html
Applied sciences	Mathematics	http://phdmath.utcluj.ro/
Humanities	Philology, Philosophy	http://litere.cunbm.utcluj.ro/doctorat/

On the IOSUD-UTCN website, under Announcements (http://iosud.utcluj.ro/anunturi.html) opportunities for PhD students are published, such as conferences organized by other universities, scholarship opportunities. The scholarships page also contains scholarship offers for PhD students.

Abstracts of doctoral theses to be publicly defended, as well as the date, time and place where they will be defended, are currently uploaded, at least 20 days before the public defense, on the platform of the doctoral school, a platform that also includes the online admission module (http://doctorat.utcluj.ro). There are also links to abstracts of PhD theses.

To summarize, Annex C211 contains details of the web location (URL) where a) the doctoral school regulations; b) the admission regulations; c) the doctoral study contract; d) the regulations for the completion of studies, including the procedure for the public defense of the thesis; e) the content of the training programmes based on advanced university studies; f) the academic and scientific profile, the thematic areas/research themes of the doctoral supervisors in the field, as well as their institutional contact details; g) list of doctoral candidates in the field with basic information (year of enrolment, supervisor); h) information on the standards for the preparation of the doctoral thesis; i) links to abstracts of doctoral theses to be publicly defended, as well as the date, time, place where they will be defended, at least 20 days before the defense.

C.2.2. IOSUD/doctoral school provides doctoral students with access to the resources needed to carry out their doctoral studies.

C.2.2.1. All doctoral students have free access to a platform with academic databases relevant to the field of doctoral studies under review

HCA 68-9 regulates this situation. All doctoral students at IOSUD-UTCN have free electronic access to scientific and research literature through the Anelis Plus portal, according to HCA 68-9. The ANELIS+ platform contains the following international electronic scientific resources: Science Direct, Springer Link Journals, American Institute of Physics, PROQUEST Central, Oxford Journals, Nature, Wiley Journals, etc. On 23.10.2017, IOSUD-UTCN signed a subsidiary contract extending the implementation period of the ANELIS PLUS 2020 project.

Access for PhD students is allowed at all times, by account and password, from anywhere, free of charge. Access to the Anelis Plus portal is possible for all employees and students who have an email account on the Technical University servers. Authentication is done with the email user or email address, and password of the UTC-N email account. Individuals who have multiple email aliases must use the email user.

UTCN PhD students have access to generalist databases with publications relevant to the field (e.g. databases of major publishers (ex. Wiley, Elsevier, etc.) or aggregator type (Ebsco, ProQuest, Web of Science, Scopus, etc.): Science Direct Freedom Collection Journals; SpringerLink Journals; Clarivate Analytics; American Institute of Physics Journals ProQuest Central; IEEE IEL; Scopus; Wiley Journals; Institute of Physics Journals; MatSciNet; SCIENCE AAAS; Nature.

C.2.2.2. Each doctoral student has access, on request, to an electronic system for checking the degree of similarity with other existing scientific or artistic creations;

HCA 68-9 regulates this situation. In order to check the originality of scientific papers, research reports and PhD theses, since 2016 the anti-plagiarism software Turnitin has been used, to which access has been created for all PhD supervisors. The way of working with Turnitin software is specified in the Doctoral School Regulations (HCA 68-5) in art. (15): "The UTCN Doctoral School must carry out the anti-plagiarism check (using the TURNITIN software provided by UTCN) and develop **the similarity report**, by the person designated for this purpose, a member of the Coordinating Council of the doctoral programme in the field concerned", and the typical procedure to be followed for checking the doctoral thesis is detailed in the Anti-Plagiarism Procedure (HCA 131-26), Procedure for completion of doctoral studies at IOSUD-UTCN (HCA 140-14), UTCN anti-plagiarism strategy HCA 131-27.

Turnitin is an application used to detect and discourage plagiarism, designed for instructors (teachers, tutors). For each paper posted as a topic/mark on Turnitin, it generates a similarity report that can be used by the instructor to identify plagiarism. Papers can be reviewed and resubmitted for verification.

The similarity report compares the text submitted for verification with the documents in its database, as well as with pages available on the Internet - books, magazines, publications - and selects similar text fragments. The resulting similarity score is a percentage of the content of the document to be checked that is similar to texts in the database checked by Turnitin. Each fragment for which a similarity was found is presented in the report together with information about the source of the identical fragment.

All doctoral theses are verified using this platform as part of the preparation process for the public defense, and the doctoral candidate and supervisor take responsibility for the results of the verification carried out in accordance with internal regulations and good practice in the field by signing a dedicated form. All PhD supervisors have individual accounts within the UTCN institutional account, and PhD students have access through their supervisors. Widespread use of this mechanism for all elements of scientific production is encouraged, and in recent years a culture of plagiarism prevention, verification and sanctioning has developed within the institution, which forms the prerequisites for high quality scientific production in line with internationally accepted academic ethics standards. IOSUD can prove the contracting of the software application that allows the verification of the degree of similarity of the scientific achievements of doctoral students, including the doctoral thesis, with other existing scientific or artistic works through the attached documents.

Turnitin is used in the development of *Similarity Report* whereby the designated expert from each field carries out the anti-plagiarism check of doctoral theses to be defended within a maximum of 30 days from the submission of the Application to start the pre-submission procedure (D1 – see *Procedure for completion of studies* in effect). *The acceptance report* of the PhD supervisor, in which he agrees to the organization of the public defense of the PhD thesis, mentions that the content of the thesis has been checked with the Turnitin similarity analysis program, provided to the PhD School by UTC-N. Finally the similarity report is uploaded to the national platform after the public defense.

C.2.2.3. All doctoral students have access to scientific research laboratories or other facilities, depending on the specific field/s within the doctoral school, according to internal regulations

HCA 68-5 (Doctoral School Regulations) ensures access for doctoral students to scientific research laboratories and other facilities. Also, the Doctoral Study Contract in section B - Obligations has specific provisions to facilitate access for doctoral students. In the Institutional Regulations (HS 1235) such provisions are found in Art. 17(4b), Art. 33(b), and Art. 80(3).

Within each research structure (center/laboratory/group), the doctoral students affiliated to them have access to the research laboratories under the internal rules of each structure. The UTCN research structures are presented both by fields and by faculties on the UTCN website and in the annex Sheet_Groups.

3. Strategies and procedures to be implemented at the level of the doctoral degree programme as measures for continuous quality improvement of doctoral study programmes, other than those set out in Annex 4 to the guide.

3.1 Admission

Admission is the decisive moment in the choice that a doctoral candidate makes for a period of at least 3 years during the doctoral studies. From this point of view, it is essential that they present themselves prepared and are properly informed about the type and volume of work. UTCN has a defined timetable (HS 1467) and a transparent and rigorous student recruitment and admission strategy, respecting the principle of equal opportunities for all applicants without any discrimination (HS 1235). In accordance with Art. 9 in the Doctoral admission regulations (see. Doctoral Admission Regulation in HS 1467) the admission session periods, the application documents and the competition tests shall be made public at least 6 months before the admission competition, by publication on the IOSUD-UTCN's own website in both Romanian and English. Doctoral students can apply for a doctoral degree if they have a Master's degree, but also if they have a Bachelor's degree or equivalent, issued up to the year of graduation of the first class of Bachelor's degree organized in accordance with the provisions of Law no. 288/2004 on the organization of university studies, with subsequent amendments and additions (long term education) - see art. 20 in the Regulation for admission to the doctoral degree in HS 1467. Admission to doctoral studies consists of at least two examinations held in front of an admission committee made up of the doctoral supervisor, who offered the place of doctoral student for admission and at least two other specialists from the Technical University of Cluj-Napoca who hold at least the position of university lecturer or scientific researcher grade II. One test consists of a language proficiency exam for an international language held in the Department of Modern Languages and Communication of UTCN. The second test is the interview in which the candidate's level of training and scientific/professional concerns, research skills and the proposed topic for the PhD thesis are analyzed. Depending on the specificities of the field, other tests may be foreseen in the doctoral admission competition, at the request of the doctoral supervisors and with the agreement of the Council of the Doctoral School (art. 29 in [18]). Admission committees are proposed by the Doctoral Programme Coordinating Councils and the Doctoral School Council and approved by the CSUD Director.

3.2 Scientific research plan

The scientific research activity is carried out in our own research centers and specialized laboratories as well as in other spaces on the basis of existing collaboration relationships within IOSUD and with other institutes in the country and abroad (see UTCN Buildings, spaces for administrative and research activities, education, chemistry labs and labs with facilitated access through collaboration with INCDTIM). Their equipment was provided both from university funds and from research contracts coordinated by the department's teaching staff.

Research internships to be carried out at international universities with which the teaching staff qualified in the field on the basis of collaboration protocols (see eUT+) and projects TEMPUS, ERASMUS and CEEPUS existing and new protocols to be concluded at the level of the Coordinating Council for Doctoral Studies in UTCN (see Mobility Accords).

3.3 Dissemination

The teaching staff serving the doctoral program capitalize on their scientific research activity through publications in specialized journals and publishing houses in the country and abroad, scientific communications presented at sessions, symposia, seminars in the country and abroad, and in contracts with partners in the country or abroad.

Through the faculty management, scientific sessions, symposia, conferences, round tables are organized periodically with teachers, researchers and graduates, and the communications are published in scientific journals, fascicles and bulletins or in volumes dedicated to the organized activity. Annual sessions of scientific communications by students are also organized. (see Dissemination Plan). The list is: competition Costa 2021 - Innovative Food, 11th edition 27 March 2021, "biologia de drag" contest, "chimia de drag" contest, Inter-county Contest of Biology, Chemistry and Food Industry, edition organized by the Department of Chemistry and Biology, Session of scientific communications of chemistry students, Session of scientific communications of biology students, Session of scientific communications of the students of the master's degrees "fundamental chemistry for education", "food science and safety", "applied biochemistry", student symposium "History of sciences", symposium "modern teaching strategies in natural sciences", Conference "Interactive Teaching Methods", ASR National Welding Conference, Symposium "Welding and Art", SIMTECH-Junior Lab, SIMTECH Junior, SIMTECH, Exhibition "Discover the 3D Universe", Innovative private solutions for sustainable buildings, in the field of renewable energies and environmental pollution, in addition to the monthly scientific seminars of teachers from the Department of Physics and Chemistry, the Department of Chemistry and Biology and scientific seminars with future PhD students in chemistry.

3.4 Educational spaces

UTCN has adequate spaces for the teaching process, laboratories equipped with modern computing technology and a library equipped with a reading room and an appropriate book collection, students and teachers have access to the University Library and the Cluj and Maramureș County Libraries, UTCN owns all the buildings in which teaching and scientific activities are carried out, the related material base consists of a complex of university buildings (campus), which also includes the university library, the university canteen and the student dormitories, the lecture halls and seminars are equipped with the possibility of using modern means of teaching: computers, video projectors, etc. , and evidence of this can be found in the Spaces Sheet. In the same annexed document there is information on the teaching spaces where teaching and research activities are and will be carried out, respecting the instructions on the minimum area per student. The laboratories contain the furniture and equipment necessary to carry out practical work specific to the disciplines of the doctoral programme. For the processing of experimental data, the design of scientific papers, progress reports and scientific work related to the PhD programme, the PhD students have their own premises in the premises of the C building in B. Muncii 103-105. There are computer places available in addition to the computers in the library reading room.

3.5 Social spaces and associated infrastructure

UTCN has social, cultural and sports services for doctoral students: accommodation in its own dormitories (see Dormitories Sheet), sports and leisure facilities, with efficient activity, organized by internal regulations. Social services offered to students include three student dormitory complexes (two in Cluj-Napoca and one in Baia Mare), canteens, 3 halls and several sports fields and a swimming sports complex located in Cluj-Napoca. The sports base has modernized, electrified courts for handball, basketball, volleyball, field tennis, football and badminton; 100 m athletics track; pit for jumping and throwing; grass pitch for mini-football; fitness gym and newly built gym. Access to the library collections is based on a library pass, according to the UTCN Library's Rules of Operation and Organization. Internal readers also benefit from services such as: bibliographies on request, electronic selection and listing of titles in the online catalog, interlibrary loan service, at the request of students and teachers. The Infostandards platform provides access to the complete set of Romanian standards, which is very useful for engineering specializations. The library's publications holdings have been gradually developed through book acquisitions, exchange of publications with various universities and institutions, and donations. Today, it is a modern university library with a collection of over 500,000 volumes of monographic and periodical publications covering almost all fields of interest. The collection of periodicals is enriched every year by subscriptions, and by internal and external exchange. The collection of books in Romanian and foreign literature exists in a sufficient number to fully cover the disciplines in the curriculum of the field, of which more than 30% represent book titles or university courses that have appeared in the last 5 years (2017 - 2021). The library has subscriptions to Romanian and foreign publications and periodicals and a rich collection of specialist books necessary for the theoretical and practical training of students in the field (see Library - books fund and Library - magazines fund) but also complementary ones.

Fig. 18. UTCN library online query system

Literature in print format (the library management system is shown in Fig. 18) - especially textbooks and treatises are found in the UTCN Library. In the period 1948-1977 the library's book stock increased 96 times, in parallel with the increase in the number of readers and the number of volumes consulted. If in 1963 the book stock was 123,502 volumes, today it reaches 557,187 volumes. The library also has 50 computers connected to the Internet. Books in the library can be quickly identified, as the library has an electronic title management system.

At UTCN level, through the ANELIS-PLUS programme, academics and students have access to scholarly articles and books through the following databases: Science direct, Springer, Web of Science, Wiley Journals, IEEE/IEL Electronic Library, de Gruyter ebooks, America Institute of Physics Journals, CAB ebooks, Institute of Physics Journals, MathSciNet, Nature Journals, Scopus. Access can be made both from computers within the university and from outside by creating an account on the website ENFORMATION.

3.6 Objectives

The basic objective of the ȘD-UTCN is to organize and develop doctoral education and in-depth scientific research in accredited doctoral fields at national and international standards of excellence, in the context of interaction with the economic, social and academic environment at local, national and international level by:

÷ providing doctoral degree programmes in collaboration with the faculties, i.e. the Doctoral Programme Coordinating Councils, to its own bachelor and master graduates as well as to graduates from study programmes of other universities in the country and abroad;

÷ development and implementation of a quality management system to continuously improve the quality of doctoral programmes;

÷ developing the procedure for assessing the content of doctoral degree programmes to ensure that they correspond to level 8 qualifications according to the National Qualifications Framework.

The quality assurance system for doctoral studies involves the following stakeholders:

÷ Council for Doctoral Studies (CSUD), responsible for strategic and decision-making processes in accordance with IOSUD-UTCN strategic plans;

÷ SD-UTCN, responsible for the management and administrative processes required for the initiation, conduct and successful completion of doctoral studies;

÷ Doctoral supervisors, responsible for the core processes of doctoral supervision and doctoral scientific research, including good research practices, research methodologies, dissemination of results and academic ethics;

÷ Doctoral students, responsible for the fulfillment of contractual obligations and for the implementation of the Advanced Degree-based Training Programme and the Individual Scientific Research Programme, with the aim of transferring skills and research results to the socio-economic environment;

÷ BEIA, in accordance with the terms of Order OM 5255 on the verification of academic ethics and deontology in the elaboration of doctoral theses from 1990-2016.

3.7 Quality assurance

The quality of undergraduate, master's and doctoral studies and research activities and service to the community are at the heart of the strategic concerns of the Technical University of Cluj-Napoca, as assumed in the Strategic Plans (HS 1253, HS 1469, HS 1493, HS 1551) and the Operational ones (HS 676, HS 824, HS 983, HS 1112a and HS 1112b, HS 1282, HS 1434, HS 1536).

3.8 Services

IOSUD-UTCN has concrete structures, strategies and procedures for monitoring and assuring the quality of activities in doctoral studies:

÷ Quality Assessment and Assurance Committee, which monitors and coordinates the implementation of the quality function at institutional level [3];

÷ Quality Assurance Office, responsible for coordinating the quality assurance process at educational level and assisting management in making strategic decisions on quality [4];

÷ Quality managers at faculty and SD-UTCN level, responsible for implementation;

÷ BEIA, a department responsible for digitizing and verifying all doctoral theses, as well as training trainers in ethics and integrity, including the operation of anti-plagiarism software.

Each structure operates in accordance with approved organizational and operational regulations and bases its work on the UTCN Quality Assurance Code. Within the IOSUD, the tasks concerning quality are carried out by the Director of the CSUD (acc. Regulament Instituțional). Concern for quality assurance in doctoral fields is evident right from the moment of admission to doctoral studies. According to the Regulation on the organization of admission to the doctoral studies cycle in UTCN (art. 27) admission to doctoral study programmes is based on selection criteria that include: academic, research and professional performance of the candidates, an interest in scientific or artistic/sporting research, publications in the field and a proposed research topic. Once admitted, the doctoral student will be mentored by a committee of 3 other UTCN teaching or research staff who hold the title of PhD or at least the position of supervisor, university lecturer or research scientist grade III and who have expertise in the thesis topic (art. 32 in Instituțional Rulebook). The mentoring committees will check/guide/proofread/support the acquisition of knowledge, skills, responsibility and autonomy by doctoral students through the analysis of the scientific research project, progress reports and associated minutes. (§3.3 in Instituțional Rulebook). The mentoring committee meets at least once every 6 months at the request of the doctoral student or supervisor. After each meeting, the mentoring committee will draw up minutes recording the progress made by the doctoral student and the committee's recommendations. In addition to mentoring during the doctoral programme with a view to preparing the doctoral thesis, the doctoral supervisor and the members of the mentoring committee will help doctoral students integrate into the scientific community: support in writing scientific articles, presentations for scientific sessions, symposia, conferences, etc. PhD students in the field will participate in the scientific seminars of the Department of Physics and Chemistry and/or the Department of Chemistry and Biology when topics relevant to their scientific research are under discussion and PhD supervisor - PhD student meetings will be scheduled weekly.

Compliance with the standards of quality and professional ethics, the originality of the content of the doctoral thesis is the responsibility of both the doctoral candidate and the supervisor (art. 54 par. 6 and art. 57 par. 4 in Instituțional Rulebook). ȘD-UTCN is subject to external evaluation every 5 years on the basis of a system of criteria and a methodology established by order of the Minister of Education and Research (art. 74 in Instituțional Rulebook). Doctoral supervisors are evaluated at least once every 5 years, focusing mainly on aspects related to the quality of the scientific results of the group led by the doctoral supervisor, with a preponderance of the impact and relevance of the scientific activity of this group at international level, respectively at national level in the case of fields with Romanian specificity and the results of the evaluation are public (art. 75 in Instituțional Rulebook). ȘD-UTCN, doctoral supervisors and doctoral students undergo periodic internal evaluation processes on dates set by the CSUD on the basis of evaluation procedures

developed by the CSUD (Art. 76 in Instituțional Rulebook). The coordination councils of the doctoral fields contribute by providing information on the scientific activity of the subordinate doctoral supervisors, infrastructure, logistics existing at the doctoral school level and proposals for the completion of the necessary for the proper conduct of activities. The periodic self-assessment of the IOSUD-UTCN aims to identify and quantify the degree of achievement of the following objectives:

- ÷ institutional compliance with legal requirements and good practice in the organization and conduct of doctoral studies;
- ÷ assessment of human resource issues, research activity, material endowment, etc. at the level of IOSUD-UTCN and SD-UTCN;
- ÷ qualitative and quantitative evaluation of the research results obtained at the level of SD-UTCN, the degree of visibility, recognition, professional prestige of PhD supervisors and PhD students;
- ÷ compliance with quality management, professional ethics and institutional transparency procedures at the level of IOSUD-UTCN, etc.

Annexes: HCA 112-9, HCA 120-10 and HCA 120-11.

3.9 Mechanisms

Annexes HCA 112-9, HCA 120-10 and HCA 120-11 comprise the system of criteria, standards and performance indicators used in the self-assessment of the SDS-UTCN and IOSUD-UTCN in accordance with OM 3200/2020[7F] and OM 3651/2021[8F]. The content of doctoral degree programmes is evaluated periodically, every 5 years, to ensure the continuity of the fulfillment of level 8 qualification according to the National Qualifications Framework. The self-assessment methodology of the activity of the SD-UTCN has been updated at the level of the fields within the SD-UTCN. The last evaluation process took place in 2021 and involved the completion by the PhD supervisors and doctoral students with Self-Assessment Sheets. The results were presented publicly in a report. in the form of a report (see http://evaluare-institutionala.utcluj.ro). Anti-plagiarism checking of doctoral theses is carried out by BEIA.

The field of doctoral studies in chemistry at UTCN subscribes, within the framework of policies, strategies and procedures, to the structures to which it belongs. In terms of logistics and infrastructure it is supported by the Faculty of Materials and Environmental Engineering and the Faculty of Science, in terms of human resources by the Department of Physics and Chemistry and the Department of Chemistry and Biology, and academically it is subordinated to the SD-UTCN. Each of these structures has its own set of policies, strategies and procedures, but all subscribe to the policies, strategies and procedures of IOSUD-UTCN as defined in the UTCN Multi-Year Strategic Plan and D111 contains the UTCN Strategic Plan for the periods 2012-2016, 2016-2020 and 2020-2024.

3.9.1 Performance through collaboration and balance in diversity

Performance through collaboration and balance in diversity (see UTCN Strategic Plan 2012-2016 in D111) is very well a guideline of permanent topicality that is very important in the development strategy to be implemented at the level of the doctoral studies field, as a measure of continuous improvement of the quality of doctoral studies programmes. It should not be forgotten that UTCN's mission is based on academic freedom, decision-making transparency, academic solidarity and collegiality, professionalism, initiative, equal opportunities, respect for the rules of conduct and action in the university environment, commitment to academic values, ensuring high quality in everything that is undertaken, individual and group

entrepreneurship, diversity in action, assumption of individual and collective responsibility, integrity, leadership based on principles, data and facts, orientation towards students and the needs of society, consistency in the successful completion of each project, emphasis on high quality as the main priority, active involvement of the entire academic body, objectivity, encouragement of open opinion, support for all those who make important contributions to maintaining UTCN in the category of elite universities in Romania. All these strengths of UTCN's development policies have led it to the strong position it holds today in the region (where together with Babeș-Bolyai University, Iuliu Hațieganu University of Medicine and Pharmacy and the University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca it represents an extraordinarily strong regional pole in the field of research and education), nationally (where together with the University of Bucharest, Babeș-Bolyai University, Alexandru Ioan Cuza University, the Academy of Economic Studies, the University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, the Universities of Medicine and Pharmacy Carol Davila, Grigore T. Popa and Iuliu Hațieganu, the Polytechnic University of Bucharest, the Technical University Gheorghe Asachi and the Polytechnic University of Timișoara represent the core of advanced research and education universities) and internationally (where together with the University of Bucharest, the Polytechnic University of Bucharest, the Academy of Economic Studies, the Babeș-Bolyai University and the University of Medicine and Pharmacy Iuliu Hațieganu occupy the best positions in international rankings and meta-rankings). It is a reality that the Romanian university environment is facing major transformations.

A paradigm shift in the way universities should relate to the needs of society is looming. The classification of universities and fields of specialization marked the beginning of direct competition for access to basic and complementary public funding, the possibility to develop study programmes in higher education (master, doctorate, post-doctorate), the type and size of study programmes. All these have consequences for the university's ability to ensure a high quality level of educational and scientific research activities. The university's position needs to be strengthened in the coming years, and this implies a more effective approach to scientific research activities, institutional development and increasing the quality of the educational process in all its aspects. As a result of the unfavorable economic and financial environment in recent years, society in general expects a more visible social and economic involvement from academia. The labor market is looking for graduates with a much stronger orientation towards solving practical problems. The need to focus scientific research activities on application-oriented aspects, leading to real partnerships with economic agents, is also demonstrated by the evolution of the funding requirements for grants from national public funds, but also for projects funded by the European Commission. There is also a growing need to strengthen collaboration with the economic environment in order to increase the quality of the educational process. Society's increasingly reduced ability to support education in general, and higher education in particular, will lead to significant changes in the evolution of the university environment in Romania. A number of elements of progress are targeted: contribution to the consolidation of UTCN as a university of advanced research and education; contribution to the existence of a creative, dynamic and stimulating environment for the professional and personal development of students and teachers, through the favorable ranking of the chemistry field in the higher ranking category (A or B), contribution to the affirmation of UTCN as an important player in the national and international context, contribution to the recognition as a pole of excellence in several fields of scientific research, among which the fields of information technology represent a strategic objective assumed through the launching of the construction procedures of the Institute of Artificial Intelligence.

The key policies underpinning the achievement of these goals must be based on an adaptive, team-based strategic plan. Collaborative relations between departments must be harmonized, their work and their relations with university departments and services better integrated. The chemistry PhD field is a beneficiary

of the merger with the University of North Baia Mare, so the two (until 2011) universities are today positioned together much better than each separately and the accumulation of human and infrastructure resources from Baia Mare and Cluj-Napoca has in fact allowed the establishment of the PhD field in chemistry. Perhaps it is a fact of poetic justice here that Professor Gavril NIAC, a native of Dragomirești, a town near Baia Mare, brought with his transfer from the University of Craiova to UTCN in 1977 the leadership of the PhD in chemistry in UTCN, and then transferred it to UBB after 1994, so that, a generation later, 3 PhD leaders - 2 from Cluj-Napoca and 1 from Baia Mare - came together to form the academic core of permanent doctoral studies in UTCN.

3.9.2 Large-scale digitalisation of all services

Large-scale computerisation of all services gives a tremendous boost to the efficient management of students, scientific research and other activities in the field of doctoral studies in chemistry and is a key element in modernizing academic management. Computerisation and intelligent management will aim to reduce bureaucracy and ensure transparency by simplifying information flows and procedures. In the current context, the quantity and quality of scientific research carried out plays a key role in its international ranking. Hence the need to support and strengthen the work of scientific research structures. Scientific research is an important source of income and image, both for the university as a whole and for each individual researcher, which is why the process of creating new research structures must be further supported, but above all the process of merging and collaborating research structures in larger, inter- and multi-disciplinary forms (research platforms, research institutes), as a clearly demonstrated need to create poles of excellence in areas of major impact for the socio-economic environment.

UTCN aims to become nationally and internationally visible in several major areas of scientific research and technological innovation. To this end, concrete actions must be taken to integrate into major interdisciplinary areas and create opportunities for interfacing with the necessary research structures. The fulfillment of quality assurance criteria is a constant of university management, leading to the definition of procedures that generate an appropriate perception of the university both in the socio-economic environment in which it evolves and among potential future students and beneficiaries of research results. Beyond procedures, quality is reflected in the work done by each teaching staff in the course and laboratory, in the work done by the collectives in developing the laboratories through various institutional development and scientific research projects.

3.9.3 A good farmer makes a good farm

From this point of view, the Romanian proverb ‘omul sfinteste locul’, which roughly translates to ‘a good farmer makes a good farm’, characterizes very well the quality assurance of the educational process and services for the socio-economic environment. That is why a policy of support for each teaching staff will be promoted, receiving high marks of appreciation from the national and international scientific community, the national and international socio-economic environment, the evaluation and accreditation bodies, as well as from students. Within the same framework, mitigation will be made for the decentralization of the decision-making system and financial resources down to departmental level, accompanied by the empowerment of departmental directors, in such a way as not to affect the stability of academic staff jobs. Financial decentralization must also take into account the contribution of the departments to the university's position among the elite universities in Romania. Academic entrepreneurship must be encouraged and an environment must be provided to support those in charge of study programmes, in agreement with department directors, in order to decentralize financial resources down to study programme level. In the same spirit, management must be exercised on the basis of objectives that are assumed and pursued at every level of decision-making. In the same way, visionary management must be exercised, based on adequate

information in the external environment, leading to proactive rather than reactive actions. Participatory management must be exercised, promoting a climate of open collaboration based on ethical and moral principles.

IOSUD-UTCN is the subject of remarkable development over the last 30 years. It is recognized that, constituting a faithful mirror of the development of the Romanian society and economy and representing in this sense both a response to their needs and a reflection of their complex evolution, the university is now part of the institutional university elite of Romania, representing a pole of academic and scientific excellence recognized regionally, nationally and internationally as the main center for the generation and dissemination of knowledge in the field of engineering sciences in northern and central Romania. This status has been built over time through the hard work and dedication with which the members of the academic community have contributed to the development of the institution of which they were part. The merger by absorption of UTCN with the Northern University of Baia Mare, has extended the regional coverage and the fields of competence towards fundamental sciences (see. UTCN Strategic Plan for the period 2016-2020 in D111), of which chemistry is a part. UTCN is today a modern, diverse and complex organization, both in terms of the human resources involved and in terms of assets, material and financial resources.

3.9.4 Highly trusted university

Following the periodic evaluation of ARACIS, UTCN is reconfirmed as a University with high confidence. The qualifications resulting from the national and international evaluations certify the capacity, intelligence and strength of the entire academic body to ensure a high quality level of educational activities and scientific research, making the university a pole of major interest for both students and society. A number of strategies subsumed in the European development strategy are also major axes in the development of the chemistry doctoral field in UTCN: **smart growth** - aiming to contribute to the development of an economy based on knowledge and innovation, **durable growth** - aiming at actions in support of a more resource-efficient, greener and more competitive economy; and **inclusive growth** - by promoting concrete actions at IOSUD-UTCN level to support a high employment rate, ensuring social and territorial cohesion. As far as the education branch is concerned, concrete actions are targeted to strengthen the correlation of specializations with labor market requirements, to speed up the process of transferring research results to the socio-economic environment, to emphasize the practical training of students in order to form skills and competences suitable for a quick and efficient insertion of graduates in the labor market.

3.9.5 The future is in the eye of those who look forward

The future is in the eye of the beholder (see UTCN Strategic Plan 2020-2024 in D111). Our ambition and future target is to contribute to UTCN becoming strongly anchored in the European area of education, research, innovation and digitisation, by promoting and supporting performance and excellence, ensuring substantial progress in terms of quality, performance, attractiveness and international competitiveness. In order for the vision to become reality, the focus of the mission assumed by the entire academic body must be focused on the permanent reshaping and adaptation of the educational, scientific research, innovation and artistic creation offer to the needs and expectations of society, on the cultivation and encouragement of the values, skills and capabilities necessary for full integration into the European area of education, artistic creation, research and innovation of excellence, on the digitisation of educational and administrative processes with a view to increasing institutional quality and performance and on enhancing the international dimension.

3.9.6 We will get better results by learning from each other and achieve more by collaborating

The procedures to be implemented follow the guidelines defined by the operational plans assumed over time by the UTCN management (see D112). Here are some of the operational measures envisaged:

÷ Modernizations of courses and practical activities, and generalization of the shift from imparting knowledge to assisted learning, coordinated and directed by teaching staff;
÷ Continuous revisions of subject files in collaboration with the socio-economic environment, in order to develop and promote the skills and competences required by the labor market;
÷ Emphasizing the practical nature of teaching activities;
÷ Organizing summer schools to motivate graduates to pursue higher levels of university education;
÷ Initiating and develop continuous training and development programmes for teachers, researchers and study advisors to better integrate graduates at all levels of university training;
÷ Implementing, in partnership with students, measures to redress problem school situations and reduce dropouts;
÷ The implementation of appropriate mechanisms for ongoing communication between students, academic advisors and teaching staff to identify problems and analyze them with the student representative;
÷ Supporting the participation of students in national and/or international competitions of scientific, cultural, sports nature, including financial support from the income available to the PhD supervisor;
÷ To create the institutional framework for the involvement of doctoral students in paid part-time activities for actions carried out in the interest of the university (such as hourly-paid activities);
÷ Using information and communication technologies to support the flexibility of scientific content;
÷ Promote the academic offer externally (and especially towards the East) by participating in international fairs presenting the educational offer, in the virtual environment, on social media and through student organizations;
÷ Supporting and stimulating incoming and outgoing Erasmus+ mobility and developing projects for the internationalization of education;
÷ Media valorization of student performance and teacher achievements;
÷ Creation, maintenance and improvement of the website dedicated to UTCN's chemistry PhD field;
÷ Participating in the Research, Innovation and Invention fair PROINVENT;
÷ Attracting foreign students and then promoting through them the PhD programme in chemistry;
÷ Implementing a coherent, stimulating and transparent system for attracting funds through sponsorships and donations from the economic environment;
÷ Joint participation in national and international development projects and organization of internships for PhD students in prestigious laboratories abroad;
÷ Capitalising on UTCN's participation in regional cluster associations (eUT+);
÷ Strengthening the presence in university extensions as an expression of the concern to serve the regional socio-economic environment;
÷ Disseminating opportunities to access structural funds; Establishing and implementing ways to support the implementation of national and international partnerships in projects financed by structural funds;
÷ Internationalization of doctoral studies through cotutelle doctorates, and affiliation to doctoral programs in the European Community;
÷ To take steps regarding the funding of research internships abroad, and to make doctoral programmes compatible with those existing at European level

4. Additional information relevant to the establishment of the doctoral field of study

4.1 Operational plan of the UTCN leadership

The operational plan of the UTCN management contains concrete measures whose beneficiary will be the newly established PhD in chemistry (see Operational plan for the period October 2022 - September 2023 in D112). Of these we highlight:

Initiative	Results and benefits	Measurable impact indicators
Improvement of the admission platform for undergraduate/master/doctoral studies at UTC-N. Short description: Identification of problems encountered; analysis of problems; identification of improvement measures and their implementation	Smooth running of the admission process	Number of candidates registered/admitted
Development of partnership and collaboration relationships with organizations in the economic environment to support: student internships, sponsorship of laboratory equipment development of study programmes	Establishing collaborative partnerships with socio-economic organizations to solve specific problems training	Number of partnership contracts signed with organizations; number of master programmes developed in collaboration with the business environment; number of laboratories improved through company support; opportunities offered by partners to students
Attract sponsorship funds from companies to support the UTCN 2023 Startup an Engineer project and other projects, e.g. (lab facilities, student scholarships, etc.)	Enter into sponsorship partnerships with socio-economic organizations to support admission and reward the development of student excellence	Number of sponsorship contracts signed with organizations
"Career Days in UTC-N", through the Career Counseling and Guidance Centre (CCOC) for the professional career development of UTC-N students. Short description: coordination, preparation and organization of the project "Career Days in UTC-N", through OCOC in Cluj and CCOP in Baia Mare, in partnership with companies in the field; offering services for students in order to increase the degree of insertion on the labor market (mock interviews, meetings with representatives from companies, webinars on personal development, offers on the labor market).	University competitiveness, graduate labor market insertion	Number of participants, number of activities carried out, number of partner companies
Organizing psychological counseling and personal development activities to help students adapt to the demands of the academic environment. Brief description: Organisation of individual and/or	Responding to requests and needs for psychological counseling in the university	Number of individual and group psychological counseling activities, number of workshops and webinars

Initiative	Results and benefits	Measurable impact indicators
group psychological counseling sessions, workshops and webinars, at the proposal of the psychological counselor, but also at the request of students or teachers, on topics agreed upon by mutual agreement		
ANTREDOC. The objective of the ANTREDOC project is to improve the quality and efficiency of tertiary education by raising the level of education, especially for groups in less developed regions. The project aims at increasing labor market skills, developing entrepreneurial skills with the aim of validating acquired competences and career guidance.	99 doctoral and postdoctoral researchers target group beneficiaries of the project, 99 doctoral and/or postdoctoral fellowships, Target group: 67 doctoral students and 32 postdoctoral students domiciled or residing in one of the seven less developed regions of Romania. PhD students in the target group are enrolled in the last two years of the PhD programme at IOSUD-UTCN.	30 doctoral/postdoctoral students employed/promoted to a senior position At least 54 PhD theses defended within 1 year after the end of the project Online platform connecting researchers and the economic environment An entrepreneurship training programme A skills training programme skills programme 99 trips for the target group materialized through participation in national and international conferences or mobility placements 99 papers published in conferences, indexed in prestigious WOS (ISI)/BDI 99 papers published in journals, indexed by prestigious WOS (ISI)/BDI
Project POCU: "Network of excellence in applied research and innovation for doctoral and postdoctoral study programmes" - InoHubDoc POCU / 993 / 6 / 13 / 153437 (2022-2023)	Support for strengthening partnerships between universities and research and innovation actors to stimulate the development of new doctoral and post-doctoral programmes. Research and networking activities for doctoral/fellow researchers to ensure complementarity with economic sectors with potential and in areas of smart specialization in support of the internationalization of tertiary education.	31 PhD students and 8 postdoctoral researchers target group - UTCN project beneficiaries
Establishment of new doctoral fields	Diversification of doctoral areas of the Doctoral School	Number of new doctoral fields
Providing grants from own income to doctoral students to support excellence in doctoral work	Increasing PhD students' involvement in teaching activity	Number of scholarships

Initiative	Results and benefits	Measurable impact indicators
Access of doctoral students to international databases through the Anelis Plus national access system	Access to scientific information	Number of accesses by PhD students through Anelis Plus
Access of doctoral students under the coordination of their PhD supervisors to Turnitin	Increased quality and originality of doctoral theses	Number of papers checked in Turnitin
Reward the publication of research results in prestigious ISI-listed international journals and other outstanding contributions through an internal grant scheme and other financial incentives foreseen by the legislation in force	Increased visibility, better positioning in international rankings, additional funding	Number of ISI publications in red category, Number of ISI publications in the yellow category Number of publications at ISI conferences other than those organized in Cluj or Baia-Mare Number of projects won
The establishment of the Institute of Artificial Intelligence - design phase of scientific objectives, infrastructure and human resource requirements.	The facilitation of obtaining funding (project for scientific objectives, equipment and necessary human capital).	Obtaining funding for the Institute
Development of the Cloud Centre to support research activity in UTCN, project "Cloud Research UTC-N-CLOUDUT", POC Axis 1	Improving the research infrastructure	Consolidated/new research structures New projects Number of articles published
Creation of a hydrogen energy and mobility research hub (H2-TREC) in partnership with Robert Bosch SRL and cu CLUSTER T.R.E.C. - TRANSYLVANIA ENERGY CLUSTER	Creating a hydrogen mobility research infrastructure Increasing research capacity and competitiveness Generating new research projects Publishing joint public-private articles	Storage source demonstrator number Introducing the research domain of the new hub created in the UTCN curriculum Number of researchers who will use the new research infrastructure Public-private scientific co-publications
Support and implement investment projects in line with the reforms and measures set out in the National Recovery and Resilience Plan by involving university types of programmes: - Innovative investments in microelectronics (IPCEI consortium) - The establishment and coordination by UTCN of one of the four Digital Innovation Hub's in advanced technologies of specialized microelectronic components and systems, allocated in the PNRR, with research institutions and industrial partners in the IPCEI consortium, for the development of innovative investment projects and programmes in microelectronics	- The development of one of the four Digital Innovation Hub's in advanced technologies of specialized microelectronic components and systems, allocated in the NRP, with partners from research institutions and industrialists in the IPCEI consortium, for the development of innovative projects and investment programs in microelectronics - The active involvement of UTCN in national microelectronics development strategies through the PNRR and IPCEI programmes - The initiation by UTC-N of a cluster for dual education in order to develop a regional consortium in the North-West region for the	Number of projects submitted and funded by the NRRP Total value of investments attracted by NRRP funded projects Number of consortia in which TCU-N will be involved as a result of the implementation of measures and reforms foreseen in the NRRP Number of consortia to be set up by TCU-N as a result of the implementation of NRDP measures and reforms

Initiative	Results and benefits	Measurable impact indicators
- The active involvement of UTCN in the national microelectronics development strategies through the PNRR and IPCEI specialized programmes foreseen in the PNRR - Support schemes for the development of 10 regional consortia (dual learning clusters) between territorial administrative units, educational units - high schools and universities, chambers of commerce and/or economic agents, other relevant partners, exclusively for the creation of optimal conditions for the training of students, and for the development and equipping of 10 integrated vocational, high school and university campuses (social infrastructure serving pre-university and university technological dual education) - Investment in research, development and innovation - Funding schemes for the university education system to achieve safety and quality standards - Strengthening the professional capacity of construction specialists and workers to achieve more energy-efficient buildings - Development of regional training and education centers and organization of training sessions - 8 territorial centers - Programme for attracting highly specialized human resources from abroad in RDI activities - Supporting centers of competence to strengthen excellence for successful participation in Horizon Europe missions - 5 centers of competence at national level on areas of strategic importance - Investment in research, development and innovation; - Horizon Europe Mentoring Programme - Investment in Research, Development and Innovation;	creation of optimal conditions for the training of students and for the development and equipping of 10 integrated vocational, high school and university campuses (social infrastructure serving pre-university and university technological dual education). - Equipping UTC-N with digital e-learning and administrative devices and platforms to respond to the challenges generated by the COVID-19 pandemic, for the creation of the new skills of the future through mechanisms of permanent innovation of study programmes. - The initiation by UTC-N of a territorial training and education center and the organization of training sessions in order to strengthen the professional capacity of specialists and workers in the field of construction for the realization of buildings with increased energy performance. - Attracting highly specialized human resources from outside Romania to UTC-N and orienting RDI activities towards current national and European issues and needs - Involving UTC-N in the competence centers for the consolidation of excellence for a successful participation in the Horizon Europe missions for areas of strategic importance - Climate neutral smart cities - Adaptation to climate change, including societal transformation - Cancer - Soil and food health, including participation in the competitive selection process. - Increasing the amount of money attracted by Horizon Europe compared to Horizon 2020, increasing the degree of cooperation between academia	

Initiative	Results and benefits	Measurable impact indicators
- Supporting RO participation and strengthening excellence for successful participation in Horizon Europe RDI partnerships and missions	and business in the development of project proposals and important national or international scientific publications. - Supporting academics and researchers from UTC-N to participate in European partnerships and Orizont Europe RDI missions.	

4.2 Swot analysis

	Useful	Damaging
Internal causes	1. Support for the establishment of the PhD in Chemistry by the heads of the faculties of Science and SME and the UTCN management 2. Good research experience of the staff involved 3. UTCN's well-developed digital infrastructure 4. Complementary fundamental orientation of the research towards the applied engineering sector	1. Low number of PhD graduates in the PhD chemistry programme 2. Low number of graduates from Master's programmes in chemistry 3. The division of the group of chemists in the department of Physics and Chemistry and in the department of Chemistry - Biology, respectively, into two faculties (Sciences and MIM) and two locations (Cluj-Napoca and Baia Mare)
External causes	1. High potential for other colleagues to become skilled in conducting PhDs and joining the PhD programme in chemistry 2. Institutional financial support for publications in high impact journals 3. Increasing interest shown by candidates from abroad for PhD studies in Romania, UTCN and Chemistry 4. A growing need on the labor market for highly qualified personnel in chemistry and biochemistry	1. Fierce competition for the same human capital with prestigious doctoral schools in the basic sciences and especially chemistry 2. Low funding of basic research by government agencies 3. Negative image of chemistry due to misuse of chemicals in agriculture and food

5. Annexed opis, in electronic format, with access via links included in the text of the internal evaluation report

Tag	Document	Details
1.1		
HS 1326	HS UTCN no. 1326 from 25.03.2021	Charter of the Technical University of Cluj-Napoca (UTCN) - updated form 2021[5] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1101HS_1326.pdf
HS 1253	HS UTCN no. 1253 from 22.10.2020	The strategic plan of UTCN 2020-2024[6] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1102HS_1253.pdf
HCA 120-12	HCA no. 12 from 11.05.2021	Ensuring achievement of level 8 qualifications according to the National Qualifications Framework (CNC) and the European Qualifications Framework (EQF) within IOSUD-UTCN[7] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1103HCA_120_12.pdf
HS 323	HS UTCN no. 323 from 7.11.2014	List of doctoral schools to operate within the IOSUD-UTCN[8] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1104HS_323.pdf
HS 856	HS UTCN no. 856 from 15.12.2017	The reorganization of the doctoral schools of the Technical University of Cluj-Napoca into a single Doctoral School of the Technical University of Cluj-Napoca and the establishment of coordinating councils for doctoral programs[9] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1105HS_856.pdf
OM 5500	OM no. 5500 from 27.10.2021 published in MO 1067 from 8.11.2021	On maintaining the accreditation of the Technical University of Cluj-Napoca for the organization of doctoral degree programmes.[10] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1106OM_5500.pdf
LEN 2011	Law no. 1 from 5.1.2011 published in MO 18 from 10.1.2011	National Education Act[11] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1107LEN_2011.pdf
HG 681	HG no. 681 from 29.6.2011 published in MO 551 from 3.8.2011	On the approval of the Code of Doctoral Studies[12] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1108HG_681.pdf
HS 1235	HS UTCN no. 1235 from 24.09.2020	Institutional Regulation on the organization and conduct of doctoral studies and postdoctoral advanced research programs in the Technical University of Cluj-Napoca with Annex 1, revised[13] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1109HS_1235.pdf
HCA 68-5	HCA no. 5 from 15 Ianuarie 2019	Regulations of the Doctoral School of the Technical University of Cluj-Napoca within IOSUD-UTCN[14] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1110HCA_68_5.pdf
HS 1407	HS UTCN no. 1407 from 28.10.2021	Establishment of the Office of Ethics and Academic Integrity (BEIA), within the staff scheme of the Council for Doctoral Studies of the Technical University of Cluj-Napoca[15] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1111HS_1407.pdf

Tag	Document	Details
HCA 131-26	HCA no. 26 from 19 Octombrie 2021	Operational procedure for verifying compliance with academic ethics and deontology in the preparation of doctoral theses (1990-2016) in IOSUD - UTCN[16] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1112HCA_131_26.pdf
HCA 131-27	HCA no. 27 from 19 Octombrie 2021	Strategy to prevent and combat plagiarism in the Technical University of Cluj-Napoca[17] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1113HCA_131_27.pdf
SD RMH	SD Normative papers	Regulations, methodologies and decisions approved in IOSUD-UTCN during the reference period 2018-2022 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1114SD_RMH.pdf
HS 1237	HS UTCN no. 1237 from 24.09.2020	Updating the regulations for obtaining the habilitation certificate and affiliation to the doctoral school of the Technical University of Cluj-Napoca[18] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1115HS_1237.pdf
HCA 164-19	HCA 164 from 25.01.2023	Operational procedure on habilitation in IOSUD-UTCN[19] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1116HCA_164_19.pdf
HS 1467	HS UTCN no. 1467 from 24.03.2022	Updating of the regulation on the organization of admission to the doctoral cycle at the Technical University of Cluj-Napoca[20] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1117HS_1467.pdf
HCA 165-16	HCA no. 16 from 7.2.2023	Approval of the timetable for admission to doctoral studies in 2023[21] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1118HCA_165_16.pdf
HCA 140-14	HCA no. 14 from 22.02.2022	Updating the operational procedure for the completion of doctoral studies at IOSUD-UTCN[22] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1119HCA_140_14.pdf
Model Contract	Doctoral studies contract example	Model of doctoral studies contract http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1120Mod_Contract.pdf
HCA 03-02	HCA from 03.02.2015	Methodology for awarding scientific research grants[23] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1121HCA_03_02.pdf
HCA 149-7	HCA 7 from 15.06.2022	Fees for the academic year 2022-2023[24] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1122HCA_149_7.pdf
HCA 112-10	HCA 10 from 19.01.2021	Approval of the reimbursement of the habilitation support fee for habilitation candidates employed at UTCN, after obtaining the habilitation certificate confirmed by the CNATCDU, affiliation to the UTCN Doctoral School and enrolment of at least one doctoral student. http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1123HCA_112_10.pdf
BIB Magazines	Magazines fund	UTCN subscriptions and bilateral journal exchange agreements http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1124Bib_Reviste.pdf
BIB Books	Book fund	UTCN's book fund http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1125Bib_Carte.pdf
HCA 68-9	HCA 9 from 15.01.2019	PhD students' access to Turnitin and ANELIS+ http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1126HCA_68_9.pdf
HCA 77-9	HCA 9 from 16.07.2019	Structure of the doctoral and habilitation thesis http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1127HCA_77_9.pdf
1.2		
OM 263327	OM 263327 from 25.10.1948 published in MO 249 from	On the organisation of higher education http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1201OM_1948.pdf

Tag	Document	Details
	26.10.1948	
HG 812	HG 812 from 28.12.1992 published in MO 337 from 29.12.1992	On the organization and functioning of the Ministry of Education http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1202HG_812.pdf
HG 84	HG 84 from 14.2.2012 published in MO 122 from 20.2.2012	Merger by absorption of UNBM into UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1203HG_84.pdf
OM 5262	OM no. 5262 from 5.9.2011 published in MO 637 from 6.11.2011	On the findings of the results of the classification of universities[25] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1204OM_5262.pdf
Bachelor's Plan	Bachelor's degree program	The plan of the undergraduate program in chemistry http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1205Plan_Licenta.pdf
Master's Plan	Master studies program	Master's degree programme plan in chemistry http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1206Plan_Master.pdf
HG 367 A2	Annex 2 to HG 367 from 20.04.2023	Nomenclature of fields and specializations/programmes of study and structure of higher education institutions for the academic year 2023-2024 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1207HG_367.pdf
HG 356 A1	Annex 1 to HG 356 from 20.04.2023	Accredited fields and programmes of study and maximum number of students that can be enrolled in the academic year 2023-2024 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1208HG_356.pdf
HCA 175-8	HCA 8 from 13.06.2023	Approval to start the procedures for the establishment of the new doctoral field "Chemistry" http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1209HCA_175_8.pdf
HS 1647	HS UTCN no. 1647 from 22.06.2023	Establishment of the PhD in Chemistry within IOSUD-UTC-N http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1210HS_1647.pdf
HS 1478	HS UTCN no. 1478 from 14.04.2022	Rector's report on the state of the Technical University of Cluj-Napoca in 2021 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1211HS_1478.pdf
HS 1621	HS UTCN no. 1621 / 27.04.2023	Rector's report on the state of the Technical University of Cluj-Napoca in 2022 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1212HS_1621.pdf
HS 1551	HS UTCN no. 1551 24.11.2022	Strategic plan for sustainable development of the Technical University of Cluj-Napoca for the period 2022 - 2030 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1213HS_1551.pdf
HS 1493	HS UTCN no. 1493 from 14.06.2022	Strategic plan for digitization of the Technical University of Cluj-Napoca 2022 - 2030 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1214HS_1493.pdf
HS 1162	HS UTCN no. 1162 / 23.03.2020	Rector's report on the state of the Technical University of Cluj-Napoca in 2019 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1215HS_1162.pdf
HS 1343	HS UTCN no. 1343 /	Rector's report on the state of the Technical University of Cluj-Napoca in 2020 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1216HS_1343.pdf

Tag	Document	Details
	22.04.2021	
PPUA Plan	Advanced University Preparation Programme	The plan of the advanced doctoral training programme in chemistry http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1217Plan_PPUA.pdf
EIA Plan	Subject sheet D16-1	Subject sheet D16-1: Ethics and Academic Integrity http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1218Plan_EIA.pdf
PSD Plan	Subject sheet D16-2	Subject sheet D16-2: Statistical processing of experimental data http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1219Plan_PSD.pdf
MAE Plan	Subject sheet D16-4	Subject sheet D16-4: Electrochemical methods of analysis http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1220Plan_MAE.pdf
ASA Plan	Subject sheet D16-5	Subject sheet D16-5: Analysis by atomic and molecular spectrometry http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1221Plan_ASA.pdf
PTM Plan	Subject sheet D16-6	Subject sheet D16-6: Technological properties of materials http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1222Plan_PTM.pdf
Std1 Thesis	Thesis draft guide	Guidelines for writing a PhD thesis -UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1223Std1_Teza.pdf
OM 4193	OM no 4193 5.7.2022	Habilitation Thomas Dippong http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1224OM_4193.pdf
OM 5633	OM no. 5633MD from 11.12.2013	Habilitation Simona Rada http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1225OM_5633.pdf
OM 3570	OM no. 3570MD from 18.04.2013	Habilitation Lorentz Jäntschi http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1226OM_3570.pdf
PO 04 IOSUD	Operational Procedure IOSUD 04 from 14.05.2021	Operational procedure for ensuring the fulfillment of level 8 qualifications according to the National Qualifications Framework (CNC) and the European Qualifications Framework (EQF) in IOSUD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1227PO_04.pdf
OM 5255	OM no. 5255 from 10.9.2021 published in MO 888 from 16.9.2011	Verification of compliance with academic ethics and deontology in the preparation of doctoral theses during the 1990-2016 period[26] http://chimie.utcluj.ro/DosarDoctorat/Anexe/A1228OM_5255.pdf
2.A		
OR 787	Rector Order no. 787 from 13.11.2014	on the appointment of the directors of the doctoral schools of the Technical University of Cluj-Napoca http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A01OR_787.pdf
OR 1079	Rector Order no. 1079 from 22.12.2015	on the appointment of the Director of the Doctoral School of Mathematics of the Technical University of Cluj-Napoca http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A02OR_1079.pdf
DR 283	Rector Decision no. 283 from 15.11.2016	on the appointment of 3 directors of doctoral schools (IMM, ETTI, and CI) http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A03DR_283.pdf
OR 498	Rector Order no. 498 from 30.9.2020	Timetable for the selection and appointment of the UTCN Doctoral School Director, UTCN Doctoral School Council members and CSUD members http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A04OR_498.pdf
DR 279	Rector's Decision no. 279 from	For the interim appointment for a period of 6 months, starting from 5.12.2018, of some members of the UTCN Doctoral School Council http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A05DR_279.pdf

Tag	Document	Details
	4.12.2018	
DR 387	Rector's Decision no. 387 from 5.12.2019	For the interim appointment for a period of 6 months, starting from 5.12.2019, of some members of the UTCN Doctoral School Council http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A06DR_387.pdf
DR 299	Rector's Decision no. 299 from 3.6.2020	For the interim appointment until 1.10.2020 of some members of the UTCN Doctoral School Council http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A07DR_299.pdf
DR 502	Rector's Decision no. 299 from 1.10.2020	Interim extension of the terms of office of some members of the UTCN Doctoral School Council until the end of the elections http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A08DR_502.pdf
OR 503	Rector's Order no. 503 from 1.10.2020	On the organization of elections for the selection and appointment of management structures dealing with the organization of doctoral studies in UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A09OR_503.pdf
DR 538	Rector's Decision no. 538 from 22.10.2020	Appointment of CSD members http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A10DR_538.pdf
DR 539	Rector's Decision no. 539 from 22.10.2020	Appointment of CSUD members http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A11DR_539.pdf
DR 540	Rector's Decision no. 540 from 22.10.2020	Appointment of coordinators of doctoral programmes http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A12DR_540.pdf
HS 722	HS UTCN no. 722 from 23.02.2017	Methodology for automatic recognition by UTCN of teaching positions obtained in accredited educational institutions abroad http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A13HS_722.pdf
HS 723	HS UTCN no. 723 from 23.02.2017	Methodology for the recognition by UTCN of the doctoral degree and the title of doctor in science or a professional field obtained abroad http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A14HS_723.pdf
HS 724	HS UTCN no. 722 from 23.02.2017	Methodology for the automatic recognition by UTCN of the quality of doctoral supervisor obtained in foreign accredited academic institutions http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A15HS_724.pdf
PV 2021	CSD CSUD Verbal Process from 28.4.2021	Concluded on 28.04.2021, 15.00 hours, on the occasion of the meeting of the CSD and CSUD of IODUD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A16PV_2021.pdf
A111e	Document Annex	Information proving the existence of the structures, the election procedure and frequency of meetings for CSUD and SD http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A17A111e.pdf
A111fg	Document Annex	Information on the regulation of the doctoral study contract and internal procedures for reviewing and approving proposals for the subject matter of the advanced degree-based training programme http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A18A111fg.pdf
PO 03 IOSUD	Operational Procedure	Procedure for the prevention and enforcement of ethics and academic integrity within IOSUD-UTCN

Tag	Document	Details
	IOSUD 03 from 09.03.2021	http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A19PO_03.pdf
PO 01 IOSUD	Operational Procedure IOSUD 01 from 09.03.2021	Procedure for completion of doctoral studies at IOSUD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A20PO_01.pdf
Mobility Sheet	Mobility agreements sheet	Erasmus + mobility agreements by faculty http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A21Fisa_Mobil.pdf
HS 1450	HS UTCN no. 1450 from 10.2.2022	Competition methodology for filling teaching and research vacancies at the Technical University of Cluj-Napoca http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A22HS_1450.pdf
HS 652	HS UTCN no. 652 from 29.2.2016	Regulations for the selection of associate teachers in UTCN (GEO 41/2016) http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A23HS_652.pdf
HS 1005	HS UTCN no. 1005 from 13.12.2018	Methodology for the organization and conduct of the promotion examination for higher education teaching careers at UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A24HS_1005.pdf
HS 1469	HS UTCN no. 1469 from 24.03.2022	Strategic plan of the Technical University of Cluj-Napoca on gender equality 2022 - 2025 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A25HS_1469.pdf
HS 1022	HS UTCN no. 1022 from 31.01.2019	Methodology for organizing elections and appointing members of the Council for Doctoral Studies (CSUD) of IOSUD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A26HS_1022.pdf
HS 1023	HS UTCN no. 1023 from 31.01.2019	Methodology for the organization of elections and appointment of the leadership of the UTCN Doctoral School and of the Coordinating Councils of the doctoral programs within IOSUD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A27HS_1023.pdf
Plan FD3	Subject sheet no. 3	Sheet of subject no. 3 of PPUA "Research activity" http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A28Plan_FD3.pdf
Sheet J0	Proof Jäntschi	Proof of tenure for L. Jäntschi http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A29Fisa_J0.pdf
Sheet R0	Proof Rada	Proof of tenure for S. Rada http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A30Fisa_R0.pdf
Sheet D0	Proof Dippong	Proof of tenure for T. Dippong http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A31Fisa_D0.pdf
HS 1654	HS UTCN no. 1654 from 22.06.2023	Rounding Prof. L. Jäntschi at ȘD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A32HS_1654.pdf
HS 1653	HS UTCN no. 1653 from 22.06.2023	Rounding Conf. T.P. Dippong at ȘD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A33HS_1653.pdf
HS 1652	HS UTCN no. 1652 from 22.06.2023	Rounding Conf. S. Rada at ȘD-UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A34HS_1652.pdf
Dissem Plan	Dissemination plan	Plan of research and scientific events involving the teaching staff serving the PhD programme in chemistry http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A35Plan_Disem.pdf
Spaces and	Available spaces and	Sheet containing the university buildings, the situation of teaching premises by faculties, the situation of administrative and research premises, teaching

Tag	Document	Details
Equipment Sheet	equipment sheet	premises and equipment in use in chemistry, research premises and equipment in use in chemistry and collaborative research equipment http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A36Fisa_Spatii.pdf
Sheet e5ani	Sheet of equipment purchased in the last 5 years	Detailed information sheet on equipment purchased in the last 5 years, distinguishing between equipment other than computing equipment, computing equipment and software http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A37Fisa_e5ani.pdf
Calc Sheet	Sheet of available computers	Sheet containing the computers at the disposal of the staff involved in the PhD chemistry programme http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A38Fisa_Calc.pdf
Soft Sheet	Software sheet	Software in use in the chemistry group http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A39Fisa_Soft.pdf
Groups Sheet	Groups sheet	Sheet of research groups formed by chemistry teachers http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A40Fisa_Grup.pdf
ERRIS Sheet	UTCN infrastructures sheet	UTCN's research infrastructure and research service offer publicly presented through the ERRIS platform http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A41Fisa_ERRIS.pdf
AM Sheet	List of mobility agreements	List of mobility agreements by faculty, country and location http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A42Lista_AM.pdf
Sheet JC1	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 1 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A43Fisa_JC1.pdf
Sheet JC2	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 2 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A44Fisa_JC2.pdf
Sheet JC3	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 3 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A45Fisa_JC3.pdf
Sheet JC4	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 4 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A46Fisa_JC4.pdf
Sheet JC5	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 5 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A47Fisa_JC5.pdf
Sheet JC6	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 6 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A48Fisa_JC6.pdf
Sheet JC7	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, L. Jäntschi, Contribution 7 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A49Fisa_JC7.pdf
Sheet RC1	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, S. Rada, Contribution 1 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A50Fisa_RC1.pdf
Sheet RC2	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, S. Rada, Contribution 2 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A51Fisa_RC2.pdf
Sheet RC3	Contribution sheet	RAchievement of relevant significance, with contributions of international level revealing progress in research, S. Rada, Contribution 3 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A52Fisa_RC3.pdf
Sheet RC4	Contribution	Achievement of relevant significance, with contributions of international level

Tag	Document	Details
	sheet	revealing progress in research, S. Rada, Contribution 4 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A53Fisa_RC4.pdf
Sheet RC5	Contribution sheet	Achievement of relevant significance, with contributions of international level revealing progress in research, S. Rada, Contribution 5 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A54Fisa_RC5.pdf
Sheet DC1	Contribution sheet	Achievement of relevant significance, with contributions at international level revealing progress in research, T. Dippong, Contribution 1 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A55Fisa_DC1.pdf
Sheet DC2	Contribution sheet	Achievement of relevant significance, with contributions at international level revealing progress in research, T. Dippong, Contribution 2 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A56Fisa_DC2.pdf
Sheet DC3	Contribution sheet	Achievement of relevant significance, with contributions at international level revealing progress in research, T. Dippong, Contribution 3 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A57Fisa_DC3.pdf
Sheet DC4	Contribution sheet	Achievement of relevant significance, with contributions at international level revealing progress in research, T. Dippong, Contribution 4 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A58Fisa_DC4.pdf
Sheet DC5	Contribution sheet	Achievement of relevant significance, with contributions at international level revealing progress in research, T. Dippong, Contribution 5 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A59Fisa_DC5.pdf
HCA 120-11	HCA no. 11 from 11.05.2021	IOSUD-UTCN activity self-assessment methodology http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A60HCA_120_11.pdf
HCA 120-10	HCA no. 10 from 11.05.2021	Self-assessment methodology of the fields within the UTCN Doctoral School http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A61HCA_120_10.pdf
HCA 112-9	HCA no. 9 from 19.01.2021	Methodology for self-evaluation of UTCN Doctoral School activity http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A62HCA_112_9.pdf
HS 630	HS UTCN no. 630 from 22.07.2016	Methodology of the competition for the position of Director of the Council for Doctoral Studies (CSUD) at I.O.S.U.D. Technical University of Cluj-Napoca http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A63HS_630.pdf
A121	Annex document	PhD application presentation and tutorial, user manual regulations and SIMAC reports http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A64A121.pdf
A122	Annex document	Existence and use of an appropriate computer program and evidence of its use for checking the percentage of similarity in all PhD theses http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A65A122.pdf
Resources Sheet	Subscribed electronic resources sheet	Subscribed scientific literature resources for research and education http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A66Fisa_Res.pdf
D1 Sheet	Standards sheet	Sheet of compliance with the minimum standards set by the CNATDCU in force at the time the dossier was drawn up, Chemistry Committee, Thomas Dippong http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A67Fisa_D1.pdf
J1 Sheet	Standards sheet	Sheet of compliance with the minimum standards set by the CNATDCU in force at the time the dossier was drawn up, Chemistry Committee, Lorentz Jäntschi http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A68Fisa_J1.pdf
R1 Sheet	Standards sheet	Compliance sheet with the minimum standards set by the CNATDCU in force at the date of preparation of the dossier, Chemistry Committee, Simona Rada http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A69Fisa_R1.pdf
OM 6129	OM no. 6129	Order of the Minister of National Education and Scientific Research no.

Tag	Document	Details
	from 20.12.2016 published in MO 123 bis from 15.2.2017	6.129/2016 (Annex 4) http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A70OM_6129.pdf
CV Dipp	CV Dippong	Curriculum Vitae Conf. Thomas DIPPONG http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A71CV_Dipp.pdf
CV Jaen	CV Jäntschi	Curriculum Vitae Prof. Lorentz JÄNTSCHI http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A72CV_Jaen.pdf
CV Rada	CV Rada	Curriculum Vitae Conf. Simona RADA http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A73CV_Rada.pdf
JM Sheet	Visibility sheet	International visibility component sheet for L. Jäntschi http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A74Fisa_JM.pdf
RM Sheet	Visibility sheet	International visibility component sheet for S. Rada http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A75Fisa_RM.pdf
DM Sheet	Visibility sheet	International visibility component sheet for T. Dippong http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A76Fisa_DM.pdf
D2 Sheet	Standards sheet	Proof of meeting 25% of the minimum standards set by the CNATDCU in force at the date of the dossier, Chemistry Committee, with papers from the last 5 years, Thomas Dippong http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A77Fisa_D2.pdf
J2 Sheet	Standards sheet	Proof of compliance with 25% of the minimum standards set by the CNATDCU in force at the time the file was drawn up, Chemistry Committee, with papers from the last 5 years, Lorentz Jäntschi http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A78Fisa_J2.pdf
R2 Sheet	Standards sheet	Proof of compliance with 25% of the minimum standards set by the CNATDCU in force at the time the file was drawn up, Chemistry Committee, with papers from the last 5 years, Simona Rada http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2A79Fisa_R2.pdf
2.B		
B121	Admission selection	Evidence of selection for admission on criteria including academic, research and professional performance of applicants, publications in the field, interview and a proposed research topic http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B01B121.pdf
RAV18	Questionnaire 2018 CD Self-assessment	Self-assessment questionnaire of IOSUD-UTCN fields conducted in 2018 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B02RAV18.pdf
RAV21	Questionnaire 2021 CD Self-assessment	Self-assessment questionnaire of IOSUD-UTCN fields carried out in 2021 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B03RAV21.pdf
RAD19	Questionnaire 2019 Self-assessmentDrd	Self-assessment questionnaire of IOSUD-UTCN fields conducted in 2018 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B04RAD19.pdf
RAD21	Questionnaire 2021 Self-assessment Drd	Self-assessment questionnaire of IOSUD-UTCN fields carried out in 2021 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B05RAD21.pdf
REV18	Report 2018 Self-assessmentCD	Self-assessment questionnaire of IOSUD-UTCN areas conducted in 2021 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B06REV18.pdf
REV21	Report 2021	Self-assessment report of the IOSUD-UTCN fields carried out in 2021

Tag	Document	Details
	Self-assessmentCD	http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B07REV21.pdf
RED19	Report 2019 Self-assessmentDrd	Report of the self-assessment of IOSUD-UTCN fields carried out in 2018 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B08RED19.pdf
RED21	Report 2021 Self-assessmentDrd	Self-assessment report of the IOSUD-UTCN fields carried out in 2021 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B09RED21.pdf
Dormitories Sheet	UTCN Dormitories Sheet	Regulation of organization and functioning of UTCN student dormitories and canteens http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2B10Fisa_Camine.pdf
2.C		
C112	Annex document	Includes evaluation mechanisms aimed at identifying the needs as well as the overall level of satisfaction with the doctoral degree programme of doctoral students http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2C01C112.pdf
C211	Annex document	Web location (URL) where a) the doctoral school regulations; b) the admission regulations; c) the doctoral study contract; d) the regulations for the completion of studies, including the procedure for the public defense of the thesis; e) the content of the training programmes based on advanced university studies; f) the academic and scientific profile, the thematic areas/research themes of the doctoral supervisors in the field, as well as their institutional contact details; g) list of doctoral candidates in the field with basic information (year of enrolment, supervisor); h) information on the standards for the preparation of the doctoral thesis; i) links to abstracts of doctoral theses to be publicly defended, as well as the date, time, place where they will be defended, at least 20 days before the defense http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2C02C211.pdf
D111	Annex document	UTCN Strategic Plan 2012-2016, 2016-2020 and 2020-2024 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2C03D111.pdf
D112	Annex document	UTCN operational plans for 2018-2022 http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2C04D112.pdf
A212	Annex document	Information on the running of the bachelor and master programs in chemistry at UTCN http://chimie.utcluj.ro/DosarDoctorat/Anexe/A2C05A212.pdf

Abbreviations

UTCN - Technical University of Cluj-Napoca
URL - Universal resource locator
UEFISCDI - Executive Unit for the Funding of Higher Education, Research, Development and Innovation
UE - European Union
RNCIS - National Register of Higher Education Qualifications
Rector - Rector of UTCN
PDF - Portable Document Format
OM - Ministerial Order
OECD - Organization for Economic Cooperation and Development
MO - Official Monitor of Romania

Ministru - Minister responsible for education in the Romanian government
IOSUD-UTCN - Organizing institution of doctoral studies UTCN
HS - UTCN Senate Decision
HG - Government Decision
HCA - Decision of the Administrative Board
Guvern - Government of Romania
EPO - European Patent Office
ȘD-UTCN - UTCN Doctoral School
DOI - Digital object identifier
DAC - UTCN Quality Assurance Department
CV - Curriculum vitae
CTTC - UTCN Centre for Technology and Knowledge Transfer
CSUD - Council for Doctoral Studies of UTCN
CRMSE - Department for Relations with the Socio-Economic Environment of UTCN
CNFIS - National Council for Higher Education Funding
CA - UTCN board of directors
BI - Newsletter (of the UTCN Board of Directors)
BEIA - UTCN Office of Ethics and Academic Integrity
ARACIS - Romanian Agency for Quality Assurance in Higher Education

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