

QUALITY ASSURANCE DIAGNOSTIC PROCEDURES WITHIN THE DOCTORAL SCHOOL OF THE UNIVERSITY OF PETROȘANI

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ABSTRACT: *The paper brings forward the quality procedures employed by The Doctoral School within a higher education institution from the South Western Region of Romania – the University of Petroșani. The above mentioned academic entity organizes doctoral studies since 1962 in four distinct fields: “Mines, Oil and Gases”, “Industrial engineering”, “Systems engineering” and “Engineering and management”. With 162 doctoral students and 23 scientific advisers in the academic year 2020-2021, The Doctoral School has developed and applied, over the last few years, a functional procedure regarding the internal evaluation and monitoring of the doctoral domains which envisages the following main dimensions: the scientific activity carried out by doctoral coordinators; the quality of infrastructure and logistics available for the research activity; the existence and the functionality of fundamental regulations on organizing and conducting the doctoral studies; the status of research activities undertaken by the doctoral students and the quality of social and support academic services. Following the permanent process of applying and monitoring such criteria, the quality of the didactic and research activities performed within the Doctoral School of University of Petroșani was acknowledged by the Ministry of Education and the Romanian Agency for Quality Insurance in Higher Education when assessing the institutional external evaluation in 2021.*

KEY WORDS: *quality procedures, The Doctoral School, research activity, infrastructure and logistics, social and academic support services.*

JEL CLASSIFICATIONS: *I23, I29.*

1. INTRODUCTION

The University of Petroșani currently assumes the role of a comprehensive higher education institution in Hunedoara County, playing an important pedagogical and scientific role both at the regional and the national level, as an academic traditional

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organisation enough competent to preserve Petroșani on the map of the most well-known university towns in Romania. The profound transformations brought about by the abolishment of the communist regime after 1990, determined the widening of the traditional educational offer of the institution in such a manner that the technical education developed alongside the foundation of a series of new Bachelor and Master study programmes in *Economics* and *Social Sciences* areas.

In 2015, the University of Petroșani underwent the external institutional evaluation process conducted by the Romanian Agency for Quality Insurance in Higher Education, as a result of which it was granted a high degree of trust certificate.

The recent years have represented for the University of Petroșani a stage of institutional and financial maturation and consolidation, accompanied by a series of successful initiatives regarding the onset and implementation of processes and activities characteristic of higher education institutions directed towards performance.

As early as 1959, the higher education institution from Petroșani obtained the right to organize doctoral studies in four disciplines, the first doctoral theses being defended in 1962; since then, over 650 doctoral theses have been completed under the supervision of the advisers at the University. Today, *The Doctoral School* is the university subdivision where the third cycle of advanced academic training is organized, representing a major component of the University organizational chart. Its role consists in managing the procedures for the application of the legislation in force and the provisions of the Regulation for the organization and development of doctoral studies.

The doctoral studies fields which are operating within the Doctoral School of the University of Petroșani (SD-UP) are focused on the continuous reconsideration of the research directions within the limits established by ARACIS, in the sense of ensuring the skills that define the professional carrier of specialists attending the third Bologna cycle, in compliance with the requirements of the labour market, as well as the transversal competences meant to meet the priorities generated by the EU strategies, to be in line with the study programs implemented by prestigious foreign universities.

Nowadays, the mission of the University of Petroșani is to generate and transfer knowledge to society through the following activities: initial and continuous students training aimed to encourage personal development, professional insertion on the labour market, to provide the socio-economic environment with scientific, technical, economic, administrative, IT, management competences etc.; scientific research, development, innovation and technological transfer in the field of technical engineering, economic and socio-humanistic sciences, IT technologies etc.

In order to fulfil its mission, the University of Petroșani owns 22 buildings, totalizing 34,780.24 square meters, of which the useful area of the buildings meant for education represents 19,421.86 square meters, the useful area of student hostels represents 9,593.33 square meters and the useful area of the sports ground represents 900.34 square meters. The spaces for didactic activity consist from: 16 auditoriums, 11 seminar halls, 113 laboratories (that frequently include computing equipment), 128 teaching staff offices and 52 bureaus. There is also a hemicycle with 496 seats and over 376 square meters, University's Central Library and a computer centre (whose total useful area represents 2,364.12 square meters), 5 student hostels (with 680 accommodation places), the Students' Restaurant, 1 mechanics workshop, 1 testing

laboratory for rocks mechanics, 1 sports ground, 1 medical facility, 1 printing house and 1 publishing house. The buildings are entirely owned by the University of Petroșani.

University's Central Library allows the free access of all students to its book collection that includes: textbooks, treatises, bibliographic references and chrestomathies, anthologies, both classically and electronically edited. The Central Library of the University of Petroșani owns today over 286,819 volumes that represent 81,283 titles. There are 119,568 volumes belonging to the class of applied sciences; 57,447 volumes to the class of exact sciences; 16,036 to the class of socio-human sciences; 20,585 volumes of language and literature and 73,183 volumes belonging to other domains (culture, religion, art, sports, geography etc.).

In order to permanently maintain contact with the new tendencies, the Central Library offers subscriptions to specialised foreign journals and permanently provides the access to the international data bases: Clarivate Analytics (Thomson) Web of Science; Clarivate Analytics Journal Citation Reports; Clarivate Analytics Derwent Innovations Index; Elsevier SCOPUS. The resources of the library can be accessed through the program *On-line Library*, using the University's website (<https://www.upet.ro/biblioteca/catalog.php>), which offers more than 50.000 bibliographic registrations.

2. GENERAL OVERVIEW OF THE DOCTORAL SCHOOL

The University of Petroșani is acknowledged as an institution organizing Doctoral Studies in the branch of Engineering Sciences, in the following fields: *Mines, Oil and Gases; Industrial engineering; Systems engineering and Engineering and management* (Table 1), under the supervision of 23 scientific advisers.

Table 1. The legal documents certifying the establishment of doctoral studies fields

No	Doctoral studies field	Number of Order granting the institution the right to organize doctoral studies in the field	No of doctoral advisers	Number of doctoral students
1	Systems engineering	4890/1999	3	19
2	Industrial engineering	4890/1999	4	32
3	Engineering and management	4911/2015	3	20
4	Mines, oil and gases	4890/1999	13	91
Total			23	162

According to the job title list for academic year 2020-2021, doctoral studies are currently supervised by a number of 23 advisers, from the Faculty of Mining Engineering and the Faculty of Mechanical and Electrical Engineering, alongside professors from "Lucian Blaga" University in Sibiu, "The Oil and Gases" University from Ploiești and researchers from INCDPM INSEMEX Petroșani (National Research and Development Institute for Mining Safety and Anti-explosive Protection). Currently, a number of 162 doctoral students are being trained at the Doctoral School in academic year 2020-2021, distributed as shown in table 1.

Of the total of 3,754 students, 294 (almost 8%) are foreign students, the majority from the Republic of Moldavia, but also from other countries: Turkmenistan, Israel, Palestine, Syria, Cameroon, France, Australia, Austria, U.S.A., Nigeria, Bangladesh – see Table 2.

The commitment of the University of Petroșani to materialize the investment efforts for equipping the spaces for didactic and research activities has been a substantial one during the last few years. As a result of such preoccupations, research infrastructure includes a series of devices acquired both owing to research grants and contracts and owing to POCU/POR projects carried out by the University during the period 2016–2020. This equipment can be compared, as far as its functionality and performance is concerned, to the equipment existing in other institutions within the European Research Space; such facilities allow the approach of highly specialized scientific themes within the doctoral research area, as part of the national and international partnerships of the University.

Table 2. Dynamics of the number of undergraduate students, Master's degree students and doctoral students between 2015-2020

Academic year	Undergraduate students		Master's degree students		Total number of undergraduate and Master's degree students			Doctoral students
	State funded	On tuition	State funded	On tuition	State funded	On tuition	Total	
2015-2016	2006	366	431	367	2437	733	3170	150
2016-2017	1905	350	438	295	2343	645	2988	157
2017-2018	1926	407	428	264	2354	671	3025	162
2018-2019	2043	337	477	306	2520	643	3163	170
2019-2020	2171	361	520	352	2691	713	3404	148
2020-2021	2191	501	518	382	2709	883	3592	162

The funding for the support of research infrastructure has its origins in financing sources such as: the HORIZON 2020 Competition; the European Commission; POR/POCU ANCS projects; UEFISCDI - the Institutional Development Fund destined to public universities (FDI) etc. Some of the most important achievements in this field are summarized in table 3. In addition to the educational and research infrastructure, the University of Petroșani has in view to develop its material resource and to modernize the existing spaces through accessing funds from the European Union. Therefore, in 2020, the institution obtained the financial resources for implementing the project entitled "*Rehabilitation and equipment acquiring for the University of Petroșani*" financed through the Regional Operational Program (POR), Axis 10.3 Improvement of educational infrastructure.

The project covers a period of 3 years and has a total budget of 13,380,083.62 lei. The amount allocated to the University of Petroșani will be entirely invested for modernizing and acquiring equipment for the higher education institution, while targeting two important coordinates:

- a) Equipping 55 laboratories with specific devices, such as: computers, laptops, intelligent boards, laboratory infrastructure etc. As a result, such equipment create the conditions for: adapting the knowledge transmitted to students to the requirements of the labour market; increasing the applicative aspect of the competences offered to these young people; increasing the transfer capacity of the knowledge of the Bachelor/ Master / Doctoral students towards the business environment; increasing the capacity of the University to manage research and development projects; focusing of research activities on concrete, applicative elements;
- b) Thermal and energy rehabilitation of the “C” building belonging to the patrimony of the University through insulating its opaque side and installing solar panels for hot water - an approach that is going to determine the saving of important amounts of money designated for covering thermal and electrical energy consumption, while increasing the degree of thermal comfort and providing optimal conditions for carrying out educational and research activities.

Table 3. The involvement of the University of Petroșani in national and international research networks

Year	No and the type of the contract/grant	Title	The contracting authority/ Beneficiary	Value (EUR or RON)
2020	847299/2019-2021	Risk assessment of final pits during flooding (RAFF)	Horizon 2020 – RFCS	135,360 EUR
2020	Project Agreement No 18248 Under Framework Partnership Agreement No. [Fpa 2016/Eit/Eit Raw Materials], Specific Grant Agreement No. [Eit/Raw Materials/Sga2019/1]. 2019-2021.	Zero Waste Recovery Of Copper Tailings In The Esee Region (Ris-Cure).	Program Horizon 2020 Subprogram Eit Raw Materials	40,625 EUR
2020	Grant Agreement Number 101004049 - Eureca-Pro	The European University For Responsible Consumption And Production (EURECA-PRO)	Education, Audiovisual And Culture Executive Agency European Commission / University of Petroșani	765,968 EUR
2020	H2020-IBA-SWAFS-Support-2-2020	Re-Eureca-Pro – Research And Innovation Dimension Of The European University On Responsible	Horizon 2020 - Research And Innovation Framework Programme	259,187.50 EUR

		Consumption and Production		
2020	Contract No. 5402/06.05.2020 POR, Axis 10.3 Improvement Of Educational Infrastructure	Rehabilitation And Equipping of The University of Petroșani	ADR Vest/University of Petroșani	13,380,083 .62 RON
2020	PN III: European And International Cooperation – Subprogram 3.2 – Horizon 2020.	Investigating The Microwave Assisted Cutting Of Carbonate Rocks. Eranet – Eramin2 – Miwacut	UEFISCDI / University of Petroșani	252,168 RON (53,200 EUR)
2018	RFCR-CT-2015-00003	Bucket Wheel Excavators Operating under Difficult Mining Conditions Including Unmineable Inclusions and Geological Structures with Excessive Mining Resistance (Bewexmin)	Horizon 2020 – RFCS 2015-2018	2,129,211 RON
2017	PN-II-PT-PCCA-2013-4-0529 Partnerships in Priority Fields Contract No. 51/2014 Stage IV/2017	Competitive Technology for Supporting Underground Mining Excavations in Compliance with High Performance Standards in the Mining and Use of Coal for Energy Production	UEFISCDI	135,969 RON

The Doctoral School publishes on the website <https://www.upet.ro/doctorat/> a set of data regarding the following major aspects involved in the management of doctoral studies: regulations of the Doctoral School operation; admission regulations; regulations for the completion of studies and the procedure regarding the public defence of theses; the content of the educational programmes; the scientific profile, research topics of the coordinators and their institutional data; the list of doctoral students in each domain and information regarding the standards imposed for the elaboration of doctoral theses; links to the abstracts of the doctoral theses which will be defended publicly. All the information complies with the general regulations regarding the protection of data.

3. QUALITY ASSURANCE PROCEDURES

Within the University of Petroșani, by the approval of the Senate and the Rector's decision, the following organisational structures characteristic of quality management operate:

- ★ The Commission for Quality Assessment and Assurance at the University of Petroșani - CEAC-U;

- ★ Commissions for Education and Quality Assurance are functioning within the councils of the three faculties;
- ★ The Department for Quality Assurance (DAC), having attributions regarding the elaboration of procedures and instruments of quality evaluation and assurance, management of quality-related data and the dissemination of information and the promotion of a culture of quality within the university.

The University of Petroșani displays various operational procedures of quality assurance in order to monitor the quality of the educational process. At the beginning of every year, the CEAC-U Commission in cooperation with the Department for Quality Assurance and the corresponding Protectorate, elaborate and present before the Senate an ample report regarding the achievement of the quality objectives during the previous year. These *Annual reports of quality self-assessment* are public and can be accessed on the University's website (www.upet.ro).

The CCEAC-U Boards carry out activities for benchmarking settling, through comparison to other universities in the country and abroad with a view to assessing and monitoring quality. For instance, within the Strategic Alliance for building the European University of Responsible Production and Consumption, EURECA-PRO partners have extensively operational quality assurance systems within which all academic entities are contingent upon standard external quality audit performed by an institution that has already comprehensively proved the adherence to the Standards and Guidelines for Quality Assurance in the EHEA (ESG), by virtue of its registration in EQAR. These systems form the basis for the assessment of the quality activities. The education and research parts of the project are assessed qualitatively and quantitatively by the consortium itself, based on an evaluation scheme and associated KPIs. But for several of the activities, outcomes and impacts will only become visible after the first three-year period.

An Operational procedure regarding the internal evaluation and monitoring of the Doctoral School/doctoral domains within the University of Petroșani has been also elaborated and applied, establishing the main evaluation and monitoring activities, as follows (Figure 1).

a) The scientific activity carried out by the doctoral coordinators. The scientific activity of doctoral coordinators is evaluated annually, each coordinator drawing up their own *Check-list for the fulfilment of national minimal standards* approved in the field they activate. According to this evaluation, The Doctoral School can decide on the affiliation/renunciation of a doctoral coordinator in line with the stipulations established in the *Regulations of organisation of doctoral studies* and the *Methodology of internal evaluation of doctoral coordinators*, approved by the Senate of the University, through the Decision no. 90, adopted in 10.06.2021. The scientific activity is visible on the international scale through the presentation of publications indexed in the Web of Sciences/Scopus/ERIH journals with an impact factor or other relevant achievements in the doctoral domains involved.

The disciplines in the training programme based on advanced academic studies related to the doctoral domain are taught by the academic staff and researchers who are habilitated coordinators, professors or associated professors with attested expertise in the field of the taught disciplines.

The coordinating committees are made of academic members who are habilitated doctoral coordinators, associated professors/scientific researchers II or lecturers in the domain, specialists in the topic of the doctoral thesis.

b) The necessary infrastructure and logistics for the research activity. These elements are evaluated according to the *Operational procedure for the internal evaluation and monitoring of the doctoral school/domains within the University of Petroșani*. The students' access to the material, didactic and research resources of the Doctoral School is enabled according to the stipulation in the *Contract of academic doctoral studies*. To carry out their scientific activity at the highest standards, doctoral students can use the facilities offered by the Research centres and laboratories of the University of Petroșani. The doctoral advisers, the members of mentoring boards and the doctoral students are members of these centres.

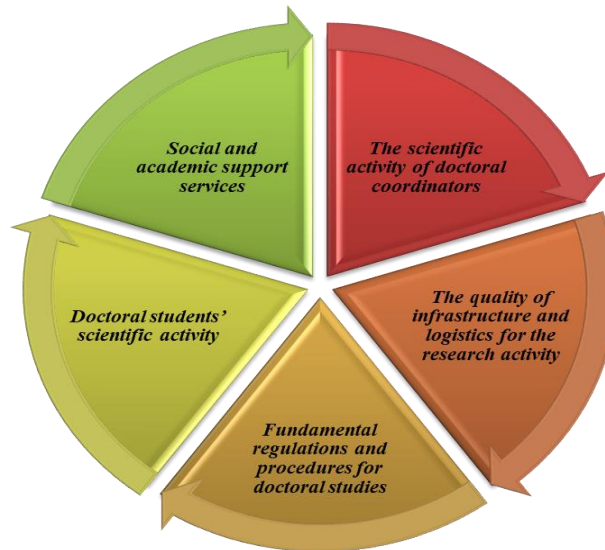


Figure 1. The main dimensions of the operational procedure regarding the internal assessment and monitoring of the doctoral domains

Table 3 presents the research laboratories pertaining to the 4 fields of doctoral studies. Research laboratories are equipped with the devices and logistics characteristic of the domain, necessary to carry out the doctoral students' scientific activity at the highest standards. Also, there are laboratories registered on the ERRIS platform.

Table 3. Research laboratories assigned to the 4 fields of doctoral studies

No.	The name of the laboratory	ERRIS	Field of doctoral studies
1.	Geology Laboratory	-	Mines, Oil and Gases
2.	Laboratory for the processing of thin and chalcographic sections	-	Mines, Oil and Gases
3.	Rock mechanics laboratory	-	Mines, Oil and Gases

4.	Earth mechanics laboratory	-	Mines, Oil and Gases
5.	Eco-pedology laboratory	-	Mines, Oil and Gases
6.	Survey laboratory	-	Mines, Oil and Gases
7.	Photogrammetry laboratory	-	Mines, Oil and Gases
8.	Geodesy laboratory	-	Mines, Oil and Gases
9.	Mechanical installations laboratory	-	Mines, Oil and Gases
10.	Traffic and transports studies laboratory		Mines, Oil and Gases
11.	Transports laboratory		Mines, Oil and Gases
12.	Machine building technology laboratory		Mines, Oil and Gases
13.	Research laboratory for the testing of building materials, elements and structures	-	Mines, Oil and Gases
14.	Pyrotechnic items and explosive materials laboratory	http://www.erris.gov.ro/Facility-for-researchdevelop	Mines, Oil and Gases
15.	“Industrial safety and ventilation” laboratory	http://www.erris.gov.ro/Facility-for-researchdevelop	Mines, Oil and Gases, Industrial Engineering, Systems Engineering
16.	“Hazard-rescue” laboratory	http://www.erris.gov.ro/Facility-for-researchdevelop	Mines, Oil and Gases, Industrial Engineering
17.	Installation of national importance e interes național <i>C-D testing ground for explosive materials, flammable/toxic substances, explosion-proof equipment and the training of rescuers working in hazardous environments</i>	http://www.erris.gov.ro/Facility-for-researchdevelop	Mines, Oil and Gases, Industrial Engineering
18.	Computer simulation laboratory	http://www.erris.gov.ro/Facility-for-researchdevelop	Mines, Oil and Gases, Industrial Engineering, Systems Engineering, Engineering and Management
19.	Occupational risk assessment	-	Industrial Engineering
20.	Occupational risk prevention	-	Industrial Engineering
21.	Thermotechnics and thermal machines	-	Industrial Engineering
22.	Mechanical vibrations laboratory	-	Industrial Engineering
23.	Maintenance, reliability and diagnosis laboratory	-	Industrial Engineering
24.	Project management laboratory	-	Industrial Engineering, Engineering and Management
25.	Pyrotechnic items and explosive materials laboratory	http://www.erris.gov.ro/Facility-for-researchdevelop	Industrial Engineering

26.	Doctoral research laboratory	https://eeris.eu/ERIF-2000-000Q-1374	Systems engineering, Engineering and Management
27.	CIM laboratory	-	Systems engineering
28.	Laboratory of for automatic adjustment engineering and industrial automation	-	Systems engineering
29.	Laboratory for analogic and digital electronics, microprocessors		Systems engineering
30.	Laboratory for Sensors, transducers and data acquisitions	-	Systems engineering
31.	Laboratory POCU 122596		Engineering and management
32.	Maintenance, reliability and diagnosis laboratory		Engineering and management

At the Faculty of Mining Engineering and the Faculty of Mechanical and Electrical Engineering there are the following research laboratories, accredited or in the course of re-accreditation: Research laboratory *for the testing of building materials, elements and structures*; Research centre *“Rocks, useful minerals and construction materials engineering”*; Laboratory *for analyses and testing in constructions*; Research centre *“Risk assessment in industry”*; Research centre *“Mechanical engineering for the mining industry”*; research centre *“Methods, techniques and software for mining processes monitoring and control”* etc.

Doctoral students also benefit from coordination and guidance from their coordinators who established a timetable of consultations and other mechanisms of guidance/coordination, e-learning platforms, personal pages etc.

c) Fundamental regulations and procedures for doctoral studies. The organization and development of doctoral studies at the University of Petroșani is regulated by:

- *Law of National Education no. 1/2011;*
- *Law no.288/2004 regarding the organization of academic studies;*
- *Law no. 49/2013 for the alteration of art. 12 in Law no. 288/2004 regarding the organization of academic studies;*
- *Ministry of Education Order no. 3482/2016 regarding the approval of the Regulation for the organization and operation of the National Council for the Validation of Academic Titles, Diplomas and Certificates;*
- *Ministry of Education Order no. 5229/2020 for the approval of methodologies regarding the awarding of the habilitation certificate and the title of doctor, as well as the settlement of complaints referring to failures to observe the quality or professional ethics standards, including the existence of plagiarism in a doctoral thesis;*
- *The Code of Doctoral studies, approved by Decision of the Romanian Government no.681/2011, with subsequent alterations and additions;*
- *Ministry of Education Order no. 5140 of September 11, 2019 for the approval of the Methodology regarding students' academic mobility;*
- *Decision no. 134 of March 2, 2016 for the alteration and completion of the Code of Doctoral studies, approved by Government Decision no. 681/2011;*

- *Ministry of Education Order no. 5140 of September 11, 2019 for the approval of the Methodology regarding students' academic mobility;*
- *Law no. 19/2019;*
- *Regulation regarding the organization and development of doctoral studies - modified and updated version, approved by the University Senate in December 2020.*
- *The Charter of the University of Petroșani (the version adopted by the Senate in 2020).*

The subsequent procedures and norms elaborated in order to ensure the running of doctoral studies, which are available on the Doctoral School webpage (<https://www.upet.ro/doctorat/>) are listed below:

- i. *Regulations regarding the organisation of academic doctoral studies at the University of Petroșani*, adopted by the Senate Decision no. 51 from 26.03.2021;
- ii. *Methodology for organising the contest for the position of director of the Council for Academic Doctoral Studies at the University of Petroșani*, valid at the date of internal evaluation, adopted by the Senate Decision no. 74 from 29.05.2019;
- iii. *Methodology of election of the director and the Board of the Doctoral School within the University of Petroșani*, adopted by the Senate Decision no. 65 from 29.04.2021;
- iv. *Methodology regarding the organization and development of admission to doctoral studies at the University of Petroșani* adopted by Senate Decision no. 37 from 09.04.2020;
- v. *Methodology for admission of foreign citizen from the member states of the European Union, the European Economic Area and the Swiss Confederation, citizens from third states of the European Union and Romanians from all over the world, within the study programmes offered by the University of Petroșani*, adopted by Senate Decision no. 92 from 09.06.2020;
- vi. *Methodology for the acknowledgement by the University of Petroșani of the doctoral coordinator position obtained in accredited foreign higher education institutions*, adopted by Senate Decision no. 40 from 26.04.2017;
- vii. *Procedure for the acknowledgement of the doctoral degree and title in sciences or other professional domain, awarded abroad*, procedure with entered in force since 20.02.2017;
- viii. *Operation procedure of the Council of the Doctoral School*, adopted by The Administration Board Decision in the 15th of June 2021.

d) Doctoral students' scientific activity. Generally speaking, the scientific activity of doctoral students can be assessed through the published articles/scientific papers within journals and volumes of international/national/student events indexed in Clarivate Analytics/Web of Science, Scopus or other international data bases. Other important proxies of the doctoral students' research endeavours are represented by: the published books; the invention patents; the scientific research contracts; the presentations performed within symposia, conferences or other scientific events which are considered representative for the Industrial Engineering domain.

In order to deepen the knowledge on the peculiarities of the scientific activity carried out by the doctoral students, table 4 summarizes the main research focus and

research themes approached by the doctoral students within University of Petroșani, according to each field of study.

Table 4. The peculiarities of the research focus and research themes approached by the doctoral students within the University of Petroșani

Field	Research focus	Research themes
Mines, Oil and Gases	Doctoral students use their knowledge and skills in an interdisciplinary and multidisciplinary field which deals with all the aspects of mineral resources exploitation by applying information from mathematics, statistics and specific engineering și methods to solve complex identified problems. Upon graduation, doctoral students will be capable of an advanced approach to the issues specific to mineral deposits exploitation, greening and sustainable development. Doctoral students can research and analyse a variety of specific engineering issues by using the knowledge acquired in the field of mining, finding innovative solutions and using modelling and simulation tools to solve various problems, having in view the difficulties raised by the natural environment in this field. Reality has proved that the rock and earth massif represent a medium whose properties are the result of a long and often mysterious evolution, since the inside of the massif eludes direct examination and can never be known completely. The solving of the problems in this field involves the thorough assessment of laboratory research, intermediary observations and the conclusions regarding the geological and hydro-geological behaviour of the massifs, on grounds of well documented charts.	The research themes are based on engineering analysis and design principles and methods; solving of different problems related with the design and monitoring of different types of underground and surface workings; stability studies; modernization of technological processes in the mining industry by using automation based on the new tendencies in artificial intelligence; modernization and optimization of transport systems in safe exploitation conditions; use of electrical equipment in potentially explosive areas from the point of view of reliability, maintenance and safe exploitation; application of unconventional methods of useful minerals mining; monitoring of surfaces and structures under the influence of underground mining; development and improvement of survey measurement methods in underground and surface mining; optimization of the information flow in mining survey; possibilities of recovering mining regions; pollution decrease in mining.
Industrial engineering	The doctoral students focus on applying science, mathematics and engineering methods in order to integrate the operations of complex industrial and social-technical systems. They use their knowledge and skills to improve the systematic use of statistical analysis, interpersonal	The research themes deal with the design, improvement and application of integrated systems consisting of people, materials and equipment. This is based on the knowledge and expertise in mathematical, physical and social sciences, as well as on engineering principles and methods of

	<p>communication, design, planning, quality control, operations management, risk assessment and management, occupational health and safety, computer modelling and problem solving. Since industrial systems are so evolutionary and complex, doctoral students must have knowledge and abilities in a wide range of disciplines, as well as the capacity to work with people and a wide, systemic view.</p>	<p>analysis necessary for the prognosis, identification and assessment of the results obtained with such systems.</p>
Systems engineering	<p>The doctoral field <i>Systems engineering</i> provides its graduates with an advanced approach based on acquiring knowledge practical skills specific to automation and information technology, largely relying on creativity and innovation. Starting from the concrete situations in different fields of activity, based on the study of literature and on the individual doctoral experience, the doctoral students will be capable of approaching a variety of engineering issues by using the acquired knowledge in the field of automation, information technology, computer modelling and statistic studies in order to find innovative solutions and new problem-solving tools. The area of expertise of the doctoral advisers is based on the following fields: electric drives control systems, robots control systems, renewable energy systems, biomedical systems, prediction systems based on big data processing, data communication systems.</p>	<p>Systems engineering covers a vast area of applications, ranging from technical fields, such as: automatic control engineering, software engineering and industrial engineering, to the study of systems organization and project management. Among the research directions we mention the following: Electric drives control; Medical robots; Autonomous vehicles/systems; Communication systems. Systems engineering enables all the elements of a project or system to be considered as a whole.</p>
Engineering and management	<p>The doctoral students in Engineering and management focus on applying science, mathematics and engineering methods in order to integrate the operations of complex industrial and social-technical systems. The doctoral students use their knowledge and skills to improve the systematic use of statistical analysis, interpersonal communication, design, planning, quality control, operations management, risk assessment and management, occupational health and safety, computer simulation and</p>	<p>Research themes deal with design, improvement and practical application of integrated systems consisting of people, materials and equipment. Research is based on knowledge and expertise in mathematics, physics, social sciences, as well as on the analysis and design engineering principles and methods for the prognosis, detection and assessment of the outcome of such systems. Research updating is supported by the attention paid to state-of-the-art technologies, the defining concepts of the fourth</p>

	<p>problem solving. The main directions of research refer to: the technical and economic optimization in the energy sector; innovative tools for increasing the company competitiveness and cultivating entrepreneurial skills; analysis of sustainable solutions for environment protection and preservation development of innovative managerial instruments necessary for sustainable resource management durable and the economic conversion of post-industrial areas; the integration of quality instruments in the management of innovative programs; project engineering and management; innovative solutions for life quality improvement; business engineering and management; human resources management from the perspective of engineering and management; aspects of industrial organizations management.</p>	<p>Industrial revolution (Industry 4.0), and the inclusion of optimization and efficiency increasing elements in an integrating context of sustainable development and life quality assurance. At the same time, the field also approaches modern manufacturing techniques and technologies, both for commonplace products, and for innovative products, whereas the area of interest covers both innovative businesses and start-ups - a phenomenon that impacts the present business and social-economic environment.</p>
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e) Social and academic support services. In order to assess the quality of the social and academic services, a detailed *Procedure for assessment of doctoral students' satisfaction* with the learning environment is consequently implemented. It is anticipated that the doctoral students will fill in the *Questionnaire regarding their level of satisfaction with the doctoral domain* every academic year. The data collected from the completed forms will be processed and the data resulted from these questionnaires will be processed so that the Board of the Doctoral School can present the conclusions before the Senate and, if necessary, the set of measures to be taken in order to improve the overall doctoral programme and the academic and management services.

Besides, at the beginning of each year, the Quality Assessment and Assurance Board (CEAC-U), in collaboration with the Department for Quality Assurance and the Vice-Rector for education, elaborates and submits before the Senate a vast report concerning the manner of carrying out the quality objectives proposed during the previous year. The report, which contains separate sections dedicated to quality assessment for teaching and research activities, ends with the presentation of a series of strong points and weak points of the investigated aspects and with formulating improvement proposals.

The University of Petroșani also has an active *Centre for Career Counselling and Guidance (CCOC)*, whose main mission is to offer information services, educational assistance, and career guidance for the students of the University in order for them to get abilities and competences specific for finding a job in the domains of the programs graduated.

4. CONCLUSIONS

The doctoral studies fields operating at the Doctoral School of the University of Petroșani are characterized by the emphasis on research and the continuous efforts to connect it both to the present needs of the society and to the present international research methods and tendencies. Efforts are also directed towards the training of researchers with a high level of expertise with a view to developing competitive human resources capable of high performance, adapted to the needs of national economy. The doctoral research programs are conceived in such a way as to ensure:

- The development of continuous education by providing high quality educational offer, relevant for the labour market and meant to ensure equal life-long learning opportunities in order to improve employment chances;
- The development of research by improving and diversifying the doctoral and post-doctoral education offer;
- The promotion of entrepreneurial spirit and culture and of free initiative;
- Support for human resources provided in centres of excellence, the development of human resources in the field of research by doctoral and post-doctoral training programs and modules developed in cooperation with higher education institutions, as well as with institutions of applied research and development, in order to foster the local economy;
- The establishment of strong, highly competitive and internationally connected research teams at the Doctoral School.

The University continually implements various measures in order to improve the quality in education and research activities proposed by the Board and collaborates with other universities in the country (“Academica Plus” Consortium) or abroad (European Universities EURECA-PRO Strategic Alliance) with a view to identifying and adopting good practices in the domains of quality. Following the permanent process of applying and monitoring such criteria, the quality of the didactic and research activities performed within the Doctoral School of University of Petroșani was acknowledged by the Ministry of Education and the Romanian Agency for Quality Insurance in Higher Education when assessing the institutional external evaluation in 2021.

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