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# Analysis of PhD and teacher training programmes

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D1.1 Report on monitoring of  
Russian and Tajikistan  
practices in teacher training  
and competence  
enhancement (with focus on  
teaching engineering  
disciplines)

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April 2019

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Co-funded by the  
Erasmus+ Programme  
of the European Union

## Analysis of PhD and teacher training programmes

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### Document overview

Project Acronym	EXTEND
Project full title	Excellence in Engineering Education through Teacher Training and New Pedagogic Approaches in Russia and Tajikistan
Project No.	586060-EPP-1-2017-1-RO-EPPKA2-CBHE-JP
Funding Scheme	Erasmus + KA2 – Capacity Building in the field of Higher Education
Coordinator	Politehnica University of Bucharest, Romania
Work Package	WP1 (Preparation)
Leader	ELENA V. SMIRNOVA NATALIA SH. VATOLKINA
Task Title	Task 1.1 - Desk and field study of Russian and Tajikistan practices in teaching training and teacher enhancement approaches (with focus on engineering disciplines)
Outcome ref.nr.	1.1 – Report on monitoring of Russian and Tajikistan practices in teacher training and competence enhancement (with focus on teaching engineering disciplines)
Task Leader	Natalia Sh. Vatolkina
Last version date	13th of April 2019
Status	Final
Dissemination Level	International

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### Revision Sheet

Version	Date	Author (Partner/Person)	The revision reason
1.0	15/02/2019	Elena V. Smirnova	First version – draft version of WP1 Task1.1 – Outcome 1.1. sent for WP1 team feedback
1.0(2)	15/02/2019	Natalia Sh. Vatolkina	First version – draft version of WP1 Task1.1 – correction
1.0(3)	16/02/2019	Elena V. Smirnova	Appendixes added – not completed
1.0(4)	17/02/2019	Natalia Sh. Vatolkins	Methodology added
1.0(5)	18/02/2019	Elena V. Smirnova	Context background
1.0(6)	19/02/2019	Elena V. Smirnova	Context background continue
1.0(7)	03/04/2019	Natalia Sh. Vatolkina	Methodology finished. Analysis first version.
1.0(8)	04/03/2019	Elena V. Smirnova	TJ postgraduate’s study description included into Context background
1.0(9)	13/03/2019	Elena V. Smirnova	Number of Ministry Orders added
1.0(10)	15/03/2019	Natalia Sh. Vatolkina	Competences Analysis finished
1.0(11)	1/04/2019	Natalia Sh. Vatolkina	Results Analysis and Recommendations Draft Finished
1.0(12)	3/04/2019	Natalia Sh. Vatolkina	Appendices on BMSTU and MRSU edited and included
1.0(13)	6/04/2019	Elena V. Smirnova	Appendices on Ogarev NRMSU translated, edited and included
1.1(final)	12/04/2019	Karlis Valtins Daler Sharifi Elisabeth Lazarou	Formatting for the final version

**D1.1 Report on monitoring of RU and TJ practices in teacher training and competence enhancement****Analysis of PhD and teacher training programmes****Project Background Activities**

The WP1 is aimed for the preparation activity of other WPs, first of all it generates the information and methodology input for the WP 2 and WP3. Objective of the Task 1.1 is to identify strengths, weak points and areas for improvement of the system of teacher training in Russian and Tajik universities. The system of teacher development includes PhD students training in pedagogy and teaching; set of teacher training courses, plans and other local documents relating to teacher training and re-training. Deliverable 1.1 includes the report with the results of the monitoring of two major issues:

1. Analysis of curriculum contents of PhD programmes in engineering at PC universities, including courses and internships on pedagogy, learning outcomes and PhD student's teaching competences and motivation.
2. Analysis of approaches to teacher enhancement in the field of engineering including training courses, internships and placements, assessment procedures, motivation practices.

Work package 1 is a Preparation Activity although there are strong Management and Quality aspects. It has started with kick-off meeting in MGSU, Moscow, Russian Federation, December 2017. Two representatives of each partner's university and associate partners travelled to MGSU. During kick-off meeting the project operative plan with additional details and rectification has been elaborated. All consortium members signed a memorandum, regulating the overall work plan and specified the plan for the first year of the project. The Quality Control procedures discussed based on substantial EU and PC experience in previous projects. The Management structures discussed and agreed using a Steering Group approach. Project Management Board formed at the kick-off meeting. Complete On-line communication lists of email, skype as well as landline work and mobile phone created for each partner and individuals within the institutions.

An Online Platform Needs Analysis conducted and work on this has proceed straight before this meeting concludes. The Online Platform created and its further development put on as a first project milestone in the first four months of project life as an important and ongoing communication hub and as a tool for preparation, development, quality, management, sustainability and dissemination of project outcomes. A detailed report of all the processes and agreements produced within one week of end of meeting. The consortium universities academic staff made a draft methodology for monitoring of Russian and Tajikistan practices in teaching engineering disciplines and teacher enhancement approaches. The teaching established in Partner Countries examined.

After kick-off meeting the monitoring of Russian and Tajikistan practices in teacher training and competence enhancement with focus on teaching engineering disciplines took place at each PC university during 12 weeks including tuning of the monitoring methodology by UPB, UM and PC universities, self-assessment and analysis of results. The results were unified as one report presented to all consortium by MGSU (separate document). The results of the monitoring have been presented at the introduction training seminar on teaching of engineering disciplines at Khujand State University, TJ (month 10/18) attended by 16 teaching staff members of all PC universities who have been involved in implementation of WP 2. During seminar they were studying the basic concepts needed to implement the project: competence and learning outcomes approach, teacher paradigm, EU priorities in improving teacher quality and teacher education, common European framework, TUNING methodology, different approaches to competence descriptors. After returning from workshop the participants from PC universities disseminated it's results among project team members and other stakeholders at each PC university. UM, DTE, RTU contributed to the training seminar. After seminar the study of European best practices was continued by PC universities team members to make an inventory of tools and approaches applicable for the objectives of the project. The study covered the advanced technologies and teaching methods of European education, which must be understood in this project: academic mobility system, European Credit Transfer System (ECTS); project-based learning, practice oriented approach, student-centred approach, personalization, active and interactive learning (computer simulations, business and role play, case study, brainstorming etc.); blended and e-learning. Another issue to be present in the report – study of the European experiences concerning to the teacher competence enhancement with the focus on teachers in engineering disciplines. The results of the study have been present as a Report by MRSU during seminar in RTU (03/19).

**Context Background**

Russia's higher education system is only partly based on the Bologna principles and includes following levels of education [see site <https://studyinrussia.ru/en/study-in-russia/info/>]:

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- bachelor’s degree (4 years) – ISCED Level 6;
- master’s degree (2 years) – ISCED Level 7;
- PhD degree (3-4 years) – ISCED Level 9;
- specialist degree (5-6 years) – ISCED Level 8;
- clinical internship (2 years) – ISCED Level 9.

Along with the Bologna three cycle system a part of traditional Russian system has been kept in the most important and intensive education fields, such as medicine and several fields of engineering. In these fields 5 or 6 year specialist degree programmes are offered equal to ISCED Level 8. PhD degree programmes were included in system of higher education degrees only in 2013 according to the Minister of Science and Higher Education Decree #1259 dated November 19, 2013 with modifications dated April 2016. Before (between 1925 and 2013) they were regarded as post-graduate education for specialists of highest qualification and were completely research-based. The aim of students was to prepare and defend thesis to obtain so called Candidate of Science degree equal to PhD degree according to EU system. If student failed to defend thesis, he or she didn’t get any document of education. In 2012 new Federal Law № 213-FS “On Education in Russian Federation” was issued and since 2013 postgraduate education were included in system of higher education in Russian Federation.

Regulation on postgraduate education is been performed by Higher Attestation Commission of Russian Federation (VAK RF). All research fields systemized into 26, so called, specialties or mega-fields, which divided into smaller fields further. The description of research topics of each specialty is been presented in a special document named “Specialty Passport” issued by Higher Attestation Commission of Russian Federation (VAK RF). After the year 2013, the PhD programmes are the subjects to Federal Education Standards, which are issued by Ministry of Education and Science of Russian Federation and include requirements to contents, duration, learning outcomes and conditions of PhD programmes of certain specialty. To be able to offer PhD programme, the university has to get license and has to pass through state accreditation procedure every 5 years.

Graduates of a Master's or Specialist Degree can be enrolled to a PhD programme. The entry exams are foreign language, philosophy and major discipline. Every PhD programme includes regular classes according to curriculum, teaching internship and research. PhD students select a research field and subject of research for their dissertation. Full-time study lasts from 3 to 4 years, while part-time study lasts from 4 to 5 years. Upon graduation a graduate is awarded a postgraduate certificate with the corresponding qualification “Research Fellow” or “Research Teaching Fellow”. Depending on the result of the dissertation’s defense Candidate of Sciences Degree (equal to PhD status) is awarded, which is the first Degree to confirm the status of scientist. Next level can be achieved by the Researcher when the Candidates of Sciences proceed to their Doctoral Degree (the second Degree to confirm the status of scientist), which is awarded following successful completion of their doctoral dissertation. Some characteristics of the PhD programme are present in the Table 1.

Table 1. Some characteristics of the RF PhD course.

<b>Course Type</b>	<b>PhD Course</b>
Entry requirements	Master's or Specialist Degree
Duration of study	3–4 years (full-time), 4–5 years (part-time)
Academic qualification certificate	Postgraduate Degree certificate
Qualification (Degree)	Researcher (qualification), research fellow (qualification), Candidate of Sciences (degree)
Type of study	Regular classes according to curriculum, teaching internship, research
Form of final state assessment	Three qualifying examinations for a candidate's Degree, state examination, dissertation defense
Further career in a scientific and professional field	Doctoral dissertation defense
Employment	Research, analytical and scientific work in accordance with qualification

The PhD graduates have right to be employed as university teacher. After that university teacher every three years has to improve his or her skills and study at professional training programmes with the duration not less than 72 hours (2 ECTS). It is obligatory requirement to pass through teacher attestation procedure and prolong labor agreement.

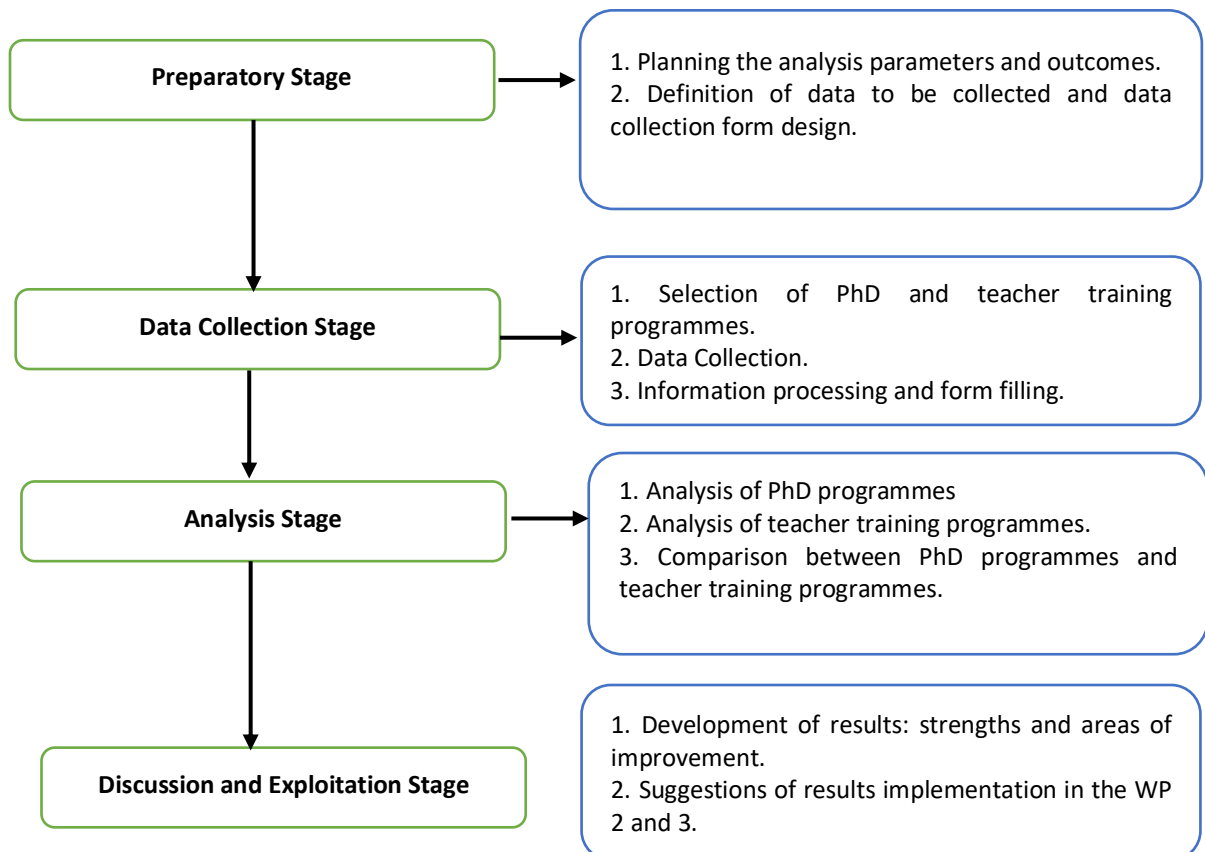


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The PhD studies in Tajikistan last 3 years. There is a special document approved by Academy of Science of Republic of Tajikistan (see site <http://anrt.tj/en/>), which describes the PhD studies as a main form of training of the scientific and scientific-pedagogical personnel in the system of Tajik postgraduate professional education. It provides citizens with the opportunity to improve the level of education, scientific and pedagogical qualifications on the basis of Tajik higher professional education. The postgraduate study is aimed at deepening the theoretical and specialized training of scientific and scientific-pedagogical personnel, mastering their methods and means of scientific research, and the ability to conduct scientific and pedagogical work independently at a high level. The postgraduate students are trained in the fields of science and scientific specialties in accordance with the current nomenclature of scientific workers. There is no mention about the possibility to train the PhD students in the field of teaching. This document states that the postgraduate studies, which are offered by institutions of Tajik higher professional education with state accreditation and scientific institutions licensed to conduct educational activities with highly qualified scientific and pedagogical and scientific personnel, modern research and experimental facilities. The possibility to open PhD programmes and their termination are approved through the relevant examination done by the Ministry of Education and Science of the Republic of Tajikistan. Examination procedure is been executed according to special order issued by the Ministry.

## Methodological Approach

The objective of analysis is been defined as identification of strengths and weaknesses of the system of pedagogical training and retraining of teachers of higher education based on analysis of PhD programmes and retraining of teachers in Russian and Tajik universities. The following tasks has to be solved to achieve the goal: selection and analysis of PhD programmes, selection and analysis of teacher training programmes, identification of strengths and areas of improvement of the system of pedagogical training and retraining of teachers of higher education. Methodology of analysis consist of the following stages: 1. Preparatory stage; 2. Data Collection Stage; 3. Analysis Stage; 4. Discussion and Exploitation Stage (picture 1).



## Analysis of PhD and teacher training programmes

Picture 1. Stages of the PhD programmes and retraining of teachers' programmes analysis

### Preparatory stage

During the PREPARATORY STAGE, it was decided that each Partner Country University should select several PhD programmes (from 3 to 5) in the field of engineering and at least one teacher training programme to evaluate. Two types of programmes have to select - the most popular programmes and the programmes, where university has greater expertise. According to the study's objectives the following parameters of each programme have to be evaluated.

For the PhD programmes there are parameters:

- number of students;
- annual enrollment;
- structure of the programme;
- learning outcomes, connected to teaching activities;
- list and content of the courses and other activities, which are dedicated to prepare PhD student for teaching;
- teaching tools and approaches taught to students;
- assessment tools and practices;
- teaching internships;
- industry cooperation;
- ICT tools used in the programme;
- international element in the programme (mobility, conferences, languages, guest lectures).

For the Teacher's training programmes there are parameters:

- number of learners;
- annual enrollment;
- structure of the programme;
- learning outcomes;
- teaching and learning tools;
- assessment tools and practices;
- number and expertise of teachers;
- delivering the course;
- e-support of the course;
- documents about completion of the course;
- industry cooperation,
- ICT tools used in the programme,
- international element in the programme (mobility, conferences, languages, guest lectures).

The data collection form was designed during seminar in Khujand and was sent to all consortium members in October 2018.

### Data Collection Stage

DATA COLLECTION STAGE started with the programme selection at partner country universities. The PhD and teacher training programmes analysed in this report are from the following Russian universities:

- MGSU – Moscow State University of Architecture and Civil Engineering,
- BMSTU – Bauman Moscow State Technical University;
- NMSTU Nosov Magnitogorsk State Technical University;
- MRSU – National Research Mordovia State University;

and following Tajik universities:

- TNU – Tajik National University;
- TUT – Technological University of Tajikistan;
- KSU – Khujand State University named after acad. B. Gafurov;

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— KuISU – Kulob State University named after Abuabdulloh Rudaki.

In total data on 30 PhD programmes and 12 Teacher Training programmes were collected by PC universities teams. The following table 1 shows the summary of data collected and analysed in this report.

**Table 1. Summary of the PC universities PhD and teacher training programmes analysed in this report**

Country/University	Number of PhD Programmes	Number of full-time PhD students (statistics over 3 years)	Number of Teacher Training Programmes	The total number of learners completed programme (statistics over 3 years)
Russia /MGSU	5	78	5	1086
Russia /BMSTU	5	75	1	687
Russia /NMSTU	5	32	2	27
Russia /MRSU	7	63	3	127
Tajikistan/TUT	5	8	-	-
Tajikistan/KSU	2	17	-	-
Tajikistan/KuISU	3	5	-	-
Tajikistan/TNU	5	6	-	-
<b>Total</b>	<b>37</b>	<b>284</b>	<b>11</b>	<b>1927</b>

Unfortunately, the number of students per PhD programme is low in Tajik Universities and vary significantly in Russian universities. In Russia the number of students depends usually on number of state scholarships available at the programme and much less depends on market needs and employer demands. Information on Teacher training programmes in Tajikistan is not available because this type of programmes usually does not offer by Tajik universities. The table 2 includes the full list of programme's names analysed in this report.

**Table 2. Summary of the PC universities PhD and teacher training programmes analysed in this report**

PhD Programmes	Teacher Training Programmes
<b>Russia /MGSU</b>	
Architecture	Methods of development, formation, approval and implementation of basic professional educational programmes of higher education
Equipment and building technologies	Electronic educational technologies. Electronic information and educational environment
Computer science and computer facilities	Organization of the educational process.
Mechanical engineering	Educational and methodical support of basic professional educational programmes of higher education
Management in technical systems	Modern information and analytical tools in the work of a teacher of higher education
<b>Russia /BMSTU</b>	
Computer science and engineering	Topical questions of professional activity of the researcher and teacher at BMSTU

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Nuclear, thermal and renewable energy and related technologies	
Mechanical Engineering	
Aviation and rocket and space technology	
Air navigation and operation of aviation and rocket and space vehicles	
<b>Russia /NMSTU</b>	
Electric and Thermal Technics Area of study – Industrial Thermotechnics	Engineering Nets and Systems. Assembling, Starting-up, Adjustment and Exploitation of Gas-Supplying Systems. Heat-Supplying, Ventilation, Water-Supplying and Drainage Systems,
Geotechnology (underground, open and construction)	Modern Progressive Technologies, Materials and Constructions in Building and Architecture
Technologies and machines of processing by pressure	
Building structures, buildings and structures	
Electrical systems and complexes	
<b>Russia /MRSU</b>	
Electrical and heat engineering (Lighting Engineering)	Information and communication technologies in the activities of a university teacher
Electrical and heat engineering (Electrotechnical complexes and systems)	Pedagogy and psychology of professional activity of teacher of higher school (Information and Communication technologies)
Electrical and heat engineering (Power plants and power systems)	Modern Educational technologies in higher education institutions
Technology, mechanization and power equipment in agriculture, forestry (Technologies and means of technical agricultural services)	
Engineering and construction technology (Building structures and buildings)	
Engineering and construction technology (Building materials and products)	
Engineering and construction technology (Heat Supply, ventilation, air conditioning, gas supply and lighting)	
<b>Tajikistan/TUT</b>	
Process, Aggregates and Equipment in Food Industry	
Process, Aggregates and Equipment in Light Industry (Textile)	
Computing machines programmaming and mathematical ensure, computer networks and complexes	
Technological process and storage of cereals, grains, beans, grains products, fruits and viticulture	
Meat, dairy, fish products technology and production of refrigerators	

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## Analysis of PhD and teacher training programmes

Tajikistan/KSU	
Mathematics	
Computer science, computing technology and management	
Tajikistan/KulsU	
Physics	
Mathematics	
Informatics	
Tajikistan/TNU	
Pharmaceutical production technologies	
Metrology Standardization and certification	
Nuclear Physics	
Mathematical and Computer modeling	
Informatica	

The analysed in this report programmes present two major research directions– engineering (19) and science (11). Data collection performed by PC university project teams as a desk and filed study. The following of documents have been used to collect data for the report: federal state education standards on PhD programmes, basic professional educational programme (a set of documents describing the contents of the programme, learning environment, teaching tools and learning outcome), curricula, course description, internship description, PhD department and academic department reports, teacher interviews.

### Analysis Stage

ANALYSIS STAGE includes three parts:

1. Analysis of PhD programmes;
2. Analysis of teacher training programmes;
3. Comparison between PhD programmes and teacher training programmes.

The analysis methods are comparison and content analysis. The comparison criterion is following:

- number of students;
- structure of the programme;
- learning outcomes, connected to teaching activities;
- list and contents of the courses and other activities, which are dedicated to prepare PhD student for teaching;
- teaching tools and approaches taught to students;
- assessment tools and practices;
- teaching internships;
- industry cooperation;
- ICT tools used in the programme;
- international element in the programme (mobility, conferences, languages, guest lectures).

The research questions to be answered by teachers are the following.

1. If the PhD programmes in Partner Country Universities include courses and internships on teaching and learning tools to prepare PhD students to be University teachers? If yes, if these courses are sufficient and up-to-date?
2. If teacher training programmes in Partner countries universities include modules on teaching and learning tools, if they are sufficient and up-to-date?

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### Analysis of PhD and teacher training programmes

3. What are strengths and weaknesses of the system of pedagogical training and retraining of teachers of higher education?

### Discussion and Exploitation stage

The final stage DISCUSSION AND EXPLOITATION supposes to produce following results:

- strengths and areas of improvement of PhD and teacher training programmes according to criteria;
- suggestions of results implementation in the WP 2 and WP 3.

### Results – PhD programmes

The PhD programmes in Russia and Tajikistan are subject to state standards and have similar structure and duration.

**In Russia** every PhD programme is of 240 ECTS or 4 years duration.

The structure of the programme includes the mandatory part (basic) and the variable part, which provides the opportunity to implement different directions within one area of training. The PhD programme consists of the following blocks:

Block 1 "Disciplines (modules)", which includes disciplines (modules) related to the basic part of the programme and discipline (modules) related to variable part. This block work load is 30 ECTS, with 9 disciplines assigned to basic part and 21 – to variable part. The disciplines (modules) of the basic part of Block 1 include disciplines: History and philosophy of science and Foreign language.

Block 2 "Internship", which fully refers to the variable part of the programme. This part includes internships to obtain professional skills and experience (including obligatory teaching internship).

Block 3 "Research", which fully refers to the variable part of the programme. Block 3 and Block 2 work load is 201 ECTS. Block 3 includes research activities and preparation of scientific qualification work (dissertation) for the degree of Candidate of Sciences.

Block 4 "State final attestation", which fully refers to the basic part of the programme (workload is 9 ECTS) and ends with the award of the qualification "Researcher. Teacher-researcher". It includes the preparation for the state exam and submission of a scientific report on the main results of the prepared scientific qualification work (dissertation), drawn up in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation. Disciplines (modules) related to the variable part of the programme, internship, research are determined by the profile of the programme and the curriculum of the training department.

**In Tajikistan** the average duration of PhD programme is 180 ECTS. The general structure is the following:

- Main courses take 15 credits including course "Methods of teaching in high schools" – 1,5 credits. (0,5 credits self-study);
- Elective courses take 12 credits (8 credits self-study), where first block include Foreign languages, IT courses and professional courses;
- Specialty subjects – 24 credits (16 credits self-study);
- Research work and experiments - 72 credits. (60 credits self-study);
- Doctoral dissertation in the specialty – 45 credits (37 credits self-study);
- Teaching practice – 9 credits (7 credits self-study);
- Professional internship (scientific) – 12credits (10 credits self-study);
- Term attestation;
- Final attestation – 3 credits (2credits self-study);
- Final exam – 3 credits (2 credits self-study);
- Dissertation's Defence.

Total: – 180 credits (141 credits self-study).

The analysis of courses and internships existing which concern to pedagogy included in PhD programmes of Russian and Tajik universities are shown at the table 3.

Table 3 Courses and internships on pedagogy included in PhD programmes of Russian and Tajik universities

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PhD Programmes	Courses on Pedagogy	Teaching Internship
<b>Russia /MGSU</b>		
All PhD programmes	Pedagogy and methods of professional education (2 ECTS)	Pedagogical Practice (3 ECTS)
<b>Russia /BMSTU</b>		
Information technology and computer science	Fundamentals of pedagogy and psychology of higher education (6 ECTS)	Pedagogical Practice (18 ECTS)
Aviation and rocket and space technology	Fundamentals of pedagogy and psychology of higher education (6 ECTS)	Pedagogical Practice (18 ECTS)
Air navigation and operation of aviation and rocket and space vehicles	Fundamentals of pedagogy and psychology of higher education (6 ECTS)	Pedagogical Practice (18 ECTS)
Mechanical Engineering	Fundamentals of pedagogy and psychology of higher education (6 ECTS)	Pedagogical Practice (18 ECTS)
<b>Russia /NMSTU</b>		
All PhD programmes	Pedagogy and Psychology of HEI (3 ECTS)	Pedagogical Practice (9 ECTS)
<b>Russia /MRSU</b>		
All PhD programmes	IT in research and education (2ECTS), included (1 ECTS self-study). Pedagogy of higher education (2ECTS), included (1 ECTS self-study)	Pedagogical Practice (3 ECTS)
<b>Tajikistan/TUT</b>		
All PhD programmes	Methods of teaching in high schools (1,5 ECTS). (0,5 credits self-study)	Teaching practice (9 ECTS)
<b>Tajikistan/KSU</b>		
All PhD programmes	Methods of teaching in high schools (1,5 ECTS) (0,5 credits self-study)	Teaching practice (9 ECTS)
<b>Tajikistan/KulSU</b>		
All PhD programmes	Methods of teaching in high schools (1,5 ECTS) (0,5 credits self-study)	Teaching practice (9 ECTS)
<b>Tajikistan/TNU</b>		
All PhD programmes	Methods of teaching in high schools (1,5 ECTS) (0,5 credits self-study)	Teaching practice (9 ECTS)

The readiness of the PhD programme graduate to teaching, as well as his/her ability to develop scientific and methodological support of academic disciplines in the professional field are formed by following activities:

- 1) study of the courses on pedagogy;
- 2) teaching internship;
- 3) preparing for the state exam.

According to the results of the State final examination the graduates are awarded the qualification of "Researcher, Teacher-researcher".

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In Russian universities each PhD programme has at least one general course on pedagogy with the duration between 2 and 6 ECTS.

In NMSTU in addition the PhD students must acquire a good level of foreign language proficiency to be able to deliver lectures for foreign students; acquire fundamentals of inclusive education to be able to deliver lectures for inclusive students.

In MRSU the additional course is included “IT in research and education” (2 ECTS). The teaching internship is obligatory and its duration varies between 3 and 18 ECTS.

In BMSTU the maximum share of curriculum dedicated to pedagogical training is 10%.

Also, it can be considered that some other courses contribute to development of related soft skills of the future university teacher, such as History and Foreign Language (all universities), Communicative and Stylistic features of the Academic language and Writing (BMSTU), Professionally-Oriented Translation (NMSTU), although the major part of curriculum is dedicated to professional courses, courses on research methodology and research activities. It is showing the traditional Soviet approach where university teacher was considered as a researcher where teaching is an additional activity which needs no special training.

In Tajik universities, the pedagogic training of PhD students is standardized even more, because there is a full consistency between all programmes and all universities. Every PhD programme includes one obligatory course Methods of teaching in high schools (1,5 ECTS including 0,5 credits of self-study) and teaching practice (9 ECTS). It means that pedagogic training share is 5,8% of PhD programme curriculum. There are also some other courses contribute to development of related soft skills of the future university teacher, such as Foreign languages, Software for Mathematical Processing (Mathlab, MathCad), Computer based processing of Scientific analyses.

## Russian Federation educational standards: competence approach in PhD student’s teaching

In Russia the Ministry of Science and Higher Education develops and issues obligatory federal state standards, which include requirements to the structure and learning outcomes of the PhD programmes including competences that graduate should possess. New generation of federal state educational standards are aligned with professional standards and there are references to professional standard of Researcher and professional standard of University teacher.

Analysis of 22 PhD programmes of Russian universities shows the following results. The field of professional activity of graduate students of Russian PhD programmes in engineering includes educational and methodical work in educational institutions of higher education. Among other things, the types of professional activity of graduates include teaching in the specific professional field (e.g. electrical and thermal engineering). Table 4 shows types of the generalized labour functions and specific labour functions of graduates in accordance with professional standards.

Table 4 Types of the generalized labour functions and specific labour functions of graduates in accordance with professional standards

Professional Standard Title	Generalized labour function	Specific Labour Function
Teacher (pedagogical activity in vocational education, higher education, additional professional education)	Teaching for the PhD students and teaching professional training courses	Participation in the development of scientific and methodological support for the implementation of PhD programmes and professional training programmes
		Teaching of courses, disciplines (modules) for the PhD programmes and professional training programmes
	Teaching for the bachelor, master and specialist degree students and teaching professional training courses	Development of scientific and methodological support of supervised subjects, courses, disciplines (modules)



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		Teaching of academic subjects, courses, disciplines (modules) on bachelor's, specialist's, master's and professional training programmes
		Organization and supervision of research and project activity of students. Supervision of student's internships of undergraduate programmes, specialty programmes, master degree programmes and professional programmes, including advisory participation in the preparation of graduation thesis
		Carrying out career guidance activities for the students, pedagogical support of professional self-determination of students of bachelor, specialist, master degree programmes and professional training programmes

## Three groups of competences

Federal education standards of higher education in Russian Federation are based on competence approach. Each federal education standard of higher education include list of competences graduate should possess upon graduation. Competences are been divided into three groups: generic competences, general professional competences and professional competences.

**Generic competences** are set for all programmes covered by one federal education standard. Generic competences show professional abilities of a person, ensuring successful human activity in a variety of both professional and social sphere [1]. Based on the fact, that the generic competencies are of a non-objective nature, their formation is been carried out within the framework of various forms of organization of the educational process regardless of the specific discipline. They are been formed not by "teaching" at the subject-content level, but due to their systematic integration into the educational process through the content, technologies and environmental factors [2], [3].

**General professional competences** reflect a set of fundamental professional abilities, knowledge and skills of a professional that are invariant for any professional activity in the specific field [4].

**Professional competences** are subject-specific competencies bearing the context of a specific professional activity and determine the competitiveness of the specialist [5].

## List of teaching competences identified in PhD programmes

For the purposes of development and assessment of competences possessed by PhD programmes graduates for each competence the learning outcomes are determined. Learning outcomes are not presented in the federal education standards. They are determined by university. It means that the same competence could be described in different learning outcomes in different universities. According to federal education standards in Russian Federation learning outcomes of each competences are divided in three parts: Know, Able To and Possess Skills. The table 5 shows a list of competences in teaching which are identified in PhD programmes.

Table 5 List of teaching competences identified in PhD programmes

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PhD Programmes	Competences	Learning outcomes description
<b>Russia /MGSU</b>		
All PhD programmes	willingness to participate in the work of Russian and international research teams to solve scientific and educational problems (GC-3)	<p><b>Know:</b> about the purposes of EHEA; paradigms of education and features of their implementation in the educational process; specific features of scientific and educational (pedagogical) research; sources of professional ethics</p> <p><b>Able to:</b> present the results of pedagogical research, considering the ethical aspects of research; to use communicative techniques of agonal rhetoric in interpersonal interaction</p> <p>consider the psychological rules of communicative influence in interpersonal communication</p>
	ability to plan and solve problems of professional and personal development (GC-5)	<p><b>Know:</b> requirements to the teacher according to professional standard; stages of professional and personal development of the teacher.</p> <p><b>Able to:</b> use step-by-step technology of professional career planning; find the " zone of individual creativity " of the teacher;</p> <p><b>Possess skills</b> in assessment of personal level of readiness for pedagogical work.</p>
	Readiness for teaching on the educational programmes of higher education (GPC-2)	<p><b>Know:</b> documents regulating the activities of the teacher; structure and components of higher education; principles of creation of educational and methodical complexes.</p> <p><b>Able to:</b></p> <p>critically analyze educational technology from the standpoint of adequacy to the objectives of the training sessions; meet the requirements for the methodological support of the educational process; to transfer competence in teaching language; to develop the plan of lectures; select and use the best teaching methods</p> <p><b>Possess skills:</b> practical use of federal education in the field of training.</p>
<b>Russia /BMSTU</b>		
Computer science and engineering	Readiness for teaching on the educational programmes of higher education (GPC-8)	<p><b>Know:</b> fundamentals of teaching in higher education, the basics of psychology</p> <p><b>Able to:</b> increase students 'interest in educational activities and those problems that are included in the content of the course, raise the effectiveness of training, to form students' practical skills through the practical oriented teaching, to create conditions for the formation of the professional thinking of the student, developing communication skills</p> <p><b>Possess skills</b> in teaching technology, which includes a variety of methods, techniques, tools</p>
Nuclear, thermal and renewable energy and related technologies	Readiness for teaching on the educational programmes of higher education (GPC-5)	<p><b>Know:</b> legal and regulatory framework of teaching in higher education</p> <p><b>To be ABLE to:</b> select and implement effective teaching tools</p> <p><b>Possess</b> technology of design of education process in higher education</p>

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## Analysis of PhD and teacher training programmes

Mechanical Engineering	Readiness for teaching on the educational programmes of higher education (GPC-8)	<p><b>Know:</b> the legal framework of teaching in higher education, the main trends in the field of mechanical engineering</p> <p><b>To be ABLE to:</b> use the best methods of teaching, to select the material that characterizes the achievements of science, taking into account the specific field of study</p> <p><b>Possess skills</b> technology of design of educational process of higher education, methods and technologies of interpersonal communication, skills of public speech taking into account specifics of the field of study</p>
Aviation and rocket and space technology	No competences related to teaching activities included in the programme	No data
Air navigation and operation of aviation and rocket and space vehicles	Readiness for teaching on the educational programmes of higher education (GPC-7)	<p><b>Know:</b> legal and regulatory framework of teaching in higher education</p> <p><b>To be ABLE to:</b> select and implement effective teaching tools</p> <p><b>Possess</b> technology of design of education process in higher education</p>
<b>Russia /NMSTU</b>		
Electric and Thermal Technics Area of study – Industrial Thermotechnics	No data	No data
Geotechnology (underground, open and construction)	Readiness for teaching on the educational programmes of higher education (GPC-8)	<p><b>Know:</b> the main types of modern educational technologies</p> <p><b>To be ABLE to:</b> to master modern interactive tools in the educational process</p> <p><b>Possess skills</b> of advising students in the preparation of their homework and coursework</p>
Technologies and machines of processing by pressure	Readiness for teaching on the educational programmes of higher education (GPC-8)	<p><b>Know</b> methodical bases of pedagogical activity of the teacher of the higher school</p> <p><b>To be able to</b> implement theoretical and methodical bases of pedagogical activity on the main educational programmes of the higher education</p> <p><b>To possess skills</b> of realization of theoretical and methodical bases of pedagogical activity on the main educational programmes of the higher education</p> <p><b>Learning outcomes of teaching internship</b></p> <p><b>Know:</b> classical methodological techniques for the presentation and explanation of topics; main development trends in the relevant field of science</p> <p><b>To be ABLE to:</b> to carry out selection of the material characterizing achievements of pedagogics taking into account specifics of the field of study</p> <p><b>Possess</b> methods and technologies of interpersonal communication, public speaking skills</p>

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<p>Building structures, buildings and structures</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-8)</p>	<p><b>Know</b> theoretical and methodical bases of pedagogical activity of the teacher of the higher school</p> <p><b>To be able to</b> implement theoretical and methodical bases of pedagogical activity on the main educational programmes of the higher education</p> <p><b>To possess skills</b> of realization of theoretical and methodical bases of pedagogical activity on the main educational programmes of the higher education</p> <p><b>Learning outcomes of teaching internship</b></p> <p><b>Know:</b> classical methodological techniques for the presentation and explanation of topics; main development trends in the relevant field of science</p> <p><b>To be ABLE to:</b> to carry out selection of the material characterizing achievements of pedagogics taking into account specifics of the field of study</p> <p><b>Possess</b> methods and technologies of interpersonal communication, public speaking skills</p>
<p>Electrical systems and complexes</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-5)</p>	<p><b>Know</b> theoretical and methodical bases of pedagogical activity of the teacher of the higher school</p> <p><b>To be able to</b> implement theoretical and methodical bases of pedagogical activity on the main educational programmes of the higher education</p> <p><b>To possess skills</b> of realization of theoretical and methodical bases of pedagogical activity on the main educational programmes of the higher education</p> <p><b>Learning outcomes of teaching internship</b></p> <p><b>Know:</b> forms of organization of education processes in higher education and legal framework of higher education</p> <p><b>To be ABLE to:</b> use educational and methodical literature on the recommended disciplines; use laboratory equipment in the recommended subjects of the curriculum; use the software in the recommended subjects of the curriculum</p> <p><b>Possess</b> skills in delivering practical classes with students on the recommended topics of academic disciplines; delivering laboratory sessions with students on the recommended topics of academic disciplines delivering lectures in student classrooms under the supervision of a teacher on topics related to the research work of a graduate student</p>
<p><b>Russia /MRSU</b></p>		
<p>Electrical and heat engineering (Lighting Engineering)</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-5)</p>	<p><b>Know:</b> teaching tools and methods for higher education</p> <p><b>Able to:</b> teach on educational programmes of higher education.</p> <p><b>Possess skills:</b> of teaching for the programmes of higher education/</p>
	<p>Readiness for teaching in the field of electrical and thermal engineering</p>	<p><b>Know:</b> teaching tools and methods for higher education in the field of electrical and thermal engineering (lighting engineering)</p>

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	(lighting engineering) (PC-4)	<p><b>Able to:</b> teach on educational programmes of higher education in the field of electrical and thermal engineering (lighting engineering).</p> <p><b>Possess skills:</b> of teaching for the programmes of higher education in the field of electrical and thermal engineering (lighting engineering).</p>
	Ability to develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (lighting engineering) (PC-5)	<p><b>Know:</b> methods of development of scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (lighting engineering).</p> <p><b>Able to:</b> develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (lighting engineering).</p> <p><b>Possess skills</b> of development of scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (lighting engineering).</p>
Electrical and heat engineering (Electrotechnical complexes and systems)	Readiness for teaching on the educational programmes of higher education (GPC-5)	<p><b>Know:</b> teaching tools and methods for higher education</p> <p><b>Able to:</b> teach on educational programmes of higher education.</p> <p><b>Possess skills:</b> of teaching for the programmes of higher education.</p>
	Readiness for teaching in the field of electrical and thermal engineering (electrotechnical complexes and systems) (PC-4)	<p><b>Know:</b> teaching tools and methods for higher education in the field of electrical and thermal engineering (electrotechnical complexes and systems)</p> <p><b>Able to:</b> teach on educational programmes of higher education in the field of electrical and thermal engineering (electrotechnical complexes and systems).</p> <p><b>Possess skills:</b> of teaching for the programmes of higher education in the field of electrical and thermal engineering (electrotechnical complexes and systems).</p>
	Ability to develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (electrotechnical complexes and systems) (PC-5)	<p><b>Know:</b> methods of development of scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (electrotechnical complexes and systems).</p> <p><b>Able to:</b> develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (electrotechnical complexes and systems).</p> <p><b>Possess skills</b> of development of scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (electrotechnical complexes and systems).</p>
Electrical and heat engineering (Power plants and power systems)	Readiness for teaching on the educational programmes of higher education (GPC-5)	<p><b>Know:</b> teaching tools and methods for higher education</p> <p><b>Able to:</b> teach on educational programmes of higher education.</p> <p><b>Possess skills:</b> of teaching for the programmes of higher education.</p>
	Readiness for teaching in the field of electrical and thermal engineering (power plants and power systems) (PC-4)	<p><b>Know:</b> teaching tools and methods for higher education in the field of electrical and thermal engineering (power plants and power systems)</p> <p><b>Able to:</b> teach on educational programmes of higher education in the field of electrical and thermal engineering (power plants and power systems).</p>

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		<p><b>Possess skills:</b> of teaching for the programmes of higher education in the field of electrical and thermal engineering (power plants and power systems).</p>
	<p>Ability to develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (power plants and power systems) (PC-5)</p>	<p><b>Know:</b> methods of development of scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (power plants and power systems).</p> <p><b>Able to:</b> develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (power plants and power systems).</p> <p><b>Possess skills</b> of development of scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (power plants and power systems).</p>
<p>Technology, mechanization and power equipment in agriculture, forestry (Technologies and means of technical agricultural services)</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-4)</p>	<p><b>Know:</b> normative legal documents regulating the organization and the content of the educational process; basic principles of development of educational programmes taking into account foreign experience;</p> <p><b>Able to:</b> develop educational programmes based on competence approach, the modular principle and the credit system; to select and use best teaching methods and assessment of students progress.</p> <p><b>Possess skills</b> of design technology of the educational process in higher education; methods and technologies of teaching and assessment of student progress.</p>
	<p>Readiness for teaching in the field of electrical and thermal engineering (power plants and power systems) (PC-4)</p>	<p><b>Know:</b> methods of organization of personnel for the purpose of research and design in areas of teaching activities in the field of agriculture;</p> <p><b>Able to:</b> organize personnel for the purpose of research and design in areas of teaching activities in the field of agriculture;</p> <p><b>Possess skills</b> to implement methods of organization of personnel for the purpose of research and design in areas of teaching activities in the field of agriculture.</p>
	<p>Ability to develop scientific and methodological support of educational disciplines in the field of electrical and thermal engineering (power plants and power systems) (PC-5)</p>	<p><b>Know:</b> methods of development of scientific and methodological support of educational disciplines in the field of agriculture.</p> <p><b>Able to:</b> develop scientific and methodological support of educational disciplines in the agriculture.</p> <p><b>Possess skills</b> of development of scientific and methodological support of educational disciplines in the agriculture.</p>
<p>Engineering and construction technology (Building structures and buildings)</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-8)</p>	<p><b>Know:</b> methodological foundations of modern pedagogy of higher education; mechanisms of the interaction of educational theory and educational practice. Pedagogical trends, principles, forms, methods, technologies of training and education in high school.</p> <p><b>Be able to:</b> use knowledge of pedagogical theories to design and implementation of tasks in subject-professional field of the University teacher.</p> <p><b>To possess: skills</b> of organizing and conducting educational and methodical work on core academic disciplines.</p>

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	<p>Readiness for teaching in the field of Engineering and construction technology (Building structures and buildings) (PC-7)</p>	<p><b>Know:</b> the specifics of professional activities of the university teacher; procedures and technologies (modeling, implementation, analysis and evaluation) of development of scientific and methodological support of academic disciplines in the field of engineering and construction technology (building structures and buildings)</p> <p><b>Be able to:</b> design content, procedure and technological support of modules of the programmes of discipline in the specific subject area, types of internships, educational tasks for independent work of students on the basis of competence-oriented training; apply modern pedagogical technologies (teaching, educational, developing) in interaction with students.</p> <p><b>To possess:</b> skills in modeling, implementation and evaluation of educational process in the field of engineering and technology construction (building structures and buildings).</p>
	<p>Ability to develop scientific and methodological support of educational disciplines in the field of technique and technology of construction (Building structures and buildings) (PC-8)</p>	<p><b>Know:</b> Modern tools used in the development of scientific and methodological support of specialized academic disciplines.</p> <p><b>Be able to:</b> Analyze possible directions of development of new methods and implementation of scientific and methodological support of specialized academic disciplines.</p> <p>Possess skills in implementation of new technologies and tools of development and implementation of scientific and methodological support of specialized academic disciplines.</p>
<p>Engineering and construction technology (Building materials and products)</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-8)</p>	<p><b>Know:</b> methodological foundations of modern pedagogy of higher education; mechanisms of the interaction of educational theory and educational practice. Pedagogical trends, principles, forms, methods, technologies of training and education in high school.</p> <p><b>Be able to:</b> use knowledge of pedagogical theories to design and implementation of tasks in subject-professional field of the University teacher.</p> <p><b>To possess: skills</b> of organizing and conducting educational and methodical work on core academic disciplines.</p>
	<p>Readiness for teaching in the field of Engineering and construction technology (Building materials and products) (PC-7)</p>	<p><b>Know:</b> the specifics of professional activities of the university teacher; procedures and technologies (modeling, implementation, analysis and evaluation) of development of scientific and methodological support of academic disciplines in the field of engineering and construction technology (Building materials and products)</p> <p><b>Be able to:</b> design content, procedure and technological support of modules of the programmes of discipline in the specific subject area, types of internships, educational tasks for independent work of students on the basis of competence-oriented training; apply modern pedagogical technologies (teaching, educational, developing) in interaction with students.</p>

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		<p><b>To possess:</b> skills in modeling, implementation and evaluation of educational process in the field of engineering and technology construction (Building materials and products).</p>
	<p>Ability to develop scientific and methodological support of educational disciplines in the field of technique and technology of construction (Building materials and products) (PC-8)</p>	<p><b>Know:</b> Modern tools used in the development of scientific and methodological support of specialized academic disciplines.</p> <p><b>Be able to:</b> Analyze possible directions of development of new methods and implementation of scientific and methodological support of specialized academic disciplines.</p> <p>Possess skills in implementation of new technologies and tools of development and implementation of scientific and methodological support of specialized academic disciplines.</p>
<p>Engineering and construction technology (Heat Supply, ventilation, air conditioning, gas supply and lighting)</p>	<p>Readiness for teaching on the educational programmes of higher education (GPC-8)</p>	<p><b>Know:</b> methodological foundations of modern pedagogy of higher education; mechanisms of the interaction of educational theory and educational practice. Pedagogical trends, principles, forms, methods, technologies of training and education in high school.</p> <p><b>Be able to:</b> use knowledge of pedagogical theories to design and implementation of tasks in subject-professional field of the University teacher.</p> <p><b>To possess: skills</b> of organizing and conducting educational and methodical work on core academic disciplines.</p>
	<p>Readiness for teaching in the field of Engineering and construction technology (Heat Supply, ventilation, air conditioning, gas supply and lighting) (PC-7)</p>	<p><b>Know:</b> the specifics of professional activities of the university teacher; procedures and technologies (modeling, implementation, analysis and evaluation) of development of scientific and methodological support of academic disciplines in the field of engineering and construction technology (Heat Supply, ventilation, air conditioning, gas supply and lighting)</p> <p><b>Be able to:</b> design content, procedure and technological support of modules of the programmes of discipline in the specific subject area, types of internships, educational tasks for independent work of students on the basis of competence-oriented training; apply modern pedagogical technologies (teaching, educational, developing) in interaction with students.</p> <p><b>To possess:</b> skills in modeling, implementation and evaluation of educational process in the field of engineering and technology construction (Heat Supply, ventilation, air conditioning, gas supply and lighting).</p>
	<p>Ability to develop scientific and methodological support of educational disciplines in the field of technique and technology of construction (Heat Supply, ventilation, air conditioning, gas supply and lighting) (PC-8)</p>	<p><b>Know:</b> Modern tools used in the development of scientific and methodological support of specialized academic disciplines.</p> <p><b>Be able to:</b> Analyze possible directions of development of new methods and implementation of scientific and methodological support of specialized academic disciplines.</p> <p><b>Possess skills</b> in implementation of new technologies and tools of development and implementation of scientific and methodological support of specialized academic disciplines.</p>



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## Analysis of PhD and teacher training programmes

Analysis of PhD programmes shows that each PhD programme includes one general professional competence on teaching – “Readiness for teaching on the educational programmes of higher education”. The PhD programmes in MGSU include in addition two general competences which are connected to teaching: “Willingness to participate in the work of Russian and international research teams to solve scientific and educational problems” and “Ability to plan and solve problems of professional and personal development”. PhD programmes in MRSU include two additional professional competences concerning teaching – “Readiness for teaching in the *specific* field” and “Ability to develop scientific and methodological support of educational disciplines in the *specific* field. It means that teaching is regarded as general professional skill for each PhD graduate although in some universities the role of the teacher is considered as more important for PhD graduate.

Content analysis of learning outcomes shows significant differences between universities in terms of what exactly should know, be able to do and which skills should PhD graduate possess to be a university teacher. Although each university includes understanding and ability to implement teaching tools, technologies and methods.

The contents of the pedagogical courses also show significant differences between universities. Analysis of the courses allows to identify three main parts: fundamentals and theories of pedagogy, psychology, methods and tools. Table presents three different examples of the courses on pedagogy. Two selected courses include three out of four main parts (modules), NMSTU course include all four parts but the number of topics is fewer. Considering that courses are rather short, the contents are ample and cover major topics to achieve necessary competences. The less attention in the courses is paid to the “Communication and classroom management”. Also, analysis show that training is oriented mostly on theory where often PhD students with engineering background try to study the fundamentals of pedagogy and pedagogical psychology in only 2 or 3 ECTS courses. The structure of the courses is not clear and rather unbalanced. It makes almost not possible to make exchange programmes for PhD students because it would be difficult to compare and recognize period of study in partner university.

## The structure of the course on pedagogy to PhD students at Russian universities

Structures of two selected courses on pedagogy delivered to PhD students at Russian universities are shown at the table 6 (see appendix 2, pages 46-73).

Table 6 – Structures of two selected courses on pedagogy delivered to PhD students at Russian universities

University	Topics in the courses on Pedagogy in different universities			
	Fundamentals and theories of pedagogy	Psychology	Methods and tools	Communication and classroom management
<b>BMSTU</b>	<b>C1</b> Modern requirements to the European engineer according to the concept of sustainable development; history of formation and development of technical education in Russia <b>C2</b> History of foreign engineering education; modern trends in the development of higher technical education in Russia and abroad. <b>C3</b> Comparative analysis of foreign systems of higher education; subject	<b>B1</b> Psychology of higher education; components of professionalism and creative self-realization of the person <b>B2</b> Self-Improvement of the person as one of the bases of achievement of tops of creative potential; pedagogical experience as result and a support of self-realization of creative	<b>A1</b> Overview and experience of the use of modern educational technologies in higher education; modernization of traditional types of training <b>A2</b> Active educational technology; project-based learning <b>A3</b> E-learning; new organizational and technological formats of educational activities	<b>D4</b> Role of the group in human behavior and activity (structure of psychological climate in the group); conscious communication in conflict situations (conflicts in different spheres of human interaction)

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	<p>"Engineering pedagogy", its place and role in the system of pedagogical science</p> <p><b>C4</b> Social expectations concerning qualities of graduate of higher technical school; professional requirements to the teacher of higher school.</p> <p><b>C5</b> Structure of activity of the teacher of the higher school; theoretical bases of a technique of teaching at the higher school</p>	<p>potential of the teacher</p> <p><b>B3</b> Pedagogical skills – the highest level of professionalism of the teacher; preparation of classroom with the use of techniques of rhetoric and public speaking</p> <p><b>D1</b> Dynamics of mental development (childhood, adolescence and youth)</p> <p><b>D2</b> Dynamics of mental development (adult psychology, old age); the role of the group in human behavior and activity (group structure, group processes)</p> <p><b>D3</b> Role of the group in human behavior and activities (group dynamics, group norms)</p>	<p><b>C6</b> Requirements for modern educational technologies in relation to the motivation of the educational situation; organizational forms and content of training at the University</p> <p><b>C7</b> Modular system of training, design goals and content of the curriculum; practical use of the properties of the material for the preparation of training sessions and presentations</p> <p><b>C8</b> Methods of preparation and control measures, methods of evaluation of the teacher, professional culture of the engineer</p> <p><b>C9</b> the Culture of high school teacher as a necessary component of educational process</p>	
<b>MRSU</b>	<p>Higher educational institution as a pedagogical system; Functioning and efficiency of pedagogical process in higher educational institution; Pedagogical activity of scientific and pedagogical workers, pedagogical laws of formation and development of the personality of the student; Process of higher education and self-education; Training in higher educational institution;</p>	No data	<p>Forms, methods and pedagogical technologies in higher educational institution; Pedagogical aspects of continuous independent work of students at training at higher education institution and after its termination.</p>	<p>Pedagogical interaction between students and pedagogical workers in the teaching process of the University in the implementation of the education standards.</p>

D1.1 Report on monitoring of RU and TJ practices in teacher training and competence enhancement

## Analysis of PhD and teacher training programmes

	Education and self-education of students; Personality of the pedagogical worker.			
<b>NMSTU</b>	<p>1. Fundamentality and humanization of education in higher education – relevance and ways of implementation.</p> <p>2. Integration processes in modern higher education.</p> <p>3. Principles of training as the main reference point in teaching.</p> <p>4. The essence, structure and driving forces of the learning process in higher education.</p> <p>6. Forms of organization of the educational process at the University.</p> <p>27. Systematic approach to the formation of the student's personality in pedagogy and psychology of higher education.</p> <p>28. Personality of the student as a subject of education and psychological and pedagogical bases of its study.</p> <p>29. The main problems and trends in the development of modern higher education.</p>	<p>8. Pedagogical skills of high school teacher.</p> <p>13. Psychological and pedagogical bases of formation of professional and pedagogical thinking of post-graduate students.</p> <p>16. Pedagogical abilities of a higher school teacher.</p> <p>23. Cognitive activity of University students, ways and means of its activation.</p> <p>24. Psychological and pedagogical bases of formation of communicative competence of students in high school.</p> <p>26. Typology of the University teacher's personality.</p>	<p>5. Teaching methods in higher education.</p> <p>7. Pedagogical technologies and their use in higher education.</p> <p>9. Business game as a form of active learning in high school.</p> <p>10. Technologies of developing education and their application in higher education.</p> <p>14. System design on the example of the development of a specific educational technology</p> <p>15. Portfolio at the University, the technological map of its preparation.</p> <p>17. Instructional strategy of the teacher of the high school.</p> <p>18. Information technologies in University education.</p> <p>19. Development of creative abilities of students (on the example of studying certain disciplines).</p> <p>20. Competence approach and its implementation in higher education.</p> <p>21. Formation of research skills of students in higher education.</p> <p>22. Development of critical thinking of students in the</p>	<p>11. Communicative characteristics of a higher school teacher.</p> <p>12. Monitoring the quality of education at the University.</p> <p>30. Organization of the research team at the higher school.</p>

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## Analysis of PhD and teacher training programmes

			educational process of higher education. 25. Development of creative thinking of students in the process of educational activities.	
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## The practical-oriented training

The practical-oriented training in teaching students receive through internships, which are aimed at understanding by student of the principles of the educational process at the University. The study and analysis of scientific and technical information, domestic and foreign experience in the area of study; the development of teaching materials, laboratory and practical training tasks and classes for bachelor and master students; classroom training, preparation for the implementation of the educational process in higher education institutions.

## Pedagogical internship

Pedagogical internship includes the following activities:

- a) development of an individual plan of internship;
- b) study of the organization of the educational process in higher education;
- c) visiting scientific and methodological consultations (seminars);
- d) study of the experience of teaching of leading University teachers;
- f) individual planning and development of the content of classes, methodological work on the subject;
- g) independent delivery of seminars, practical and laboratory classes;
- h) individual work with students, supervision of student research.

Besides contents of the courses on pedagogy, students value the active teaching tools as well as ICT tools, they value the integration of international component and involvement into activity of industry partners. Unfortunately, universities provide only general information about these dimensions of the PhD programmes.

## Involvement to the industry

**In Russian universities** the involvement of industry is provided by the opportunity for students during their period of study to:

- interact with managers and key specialists of enterprises and organizations whose practical activities are included in the area of scientific interests of the PhD student;
- to carry out the experimental part of the dissertation research on the bases of enterprises and partner organizations of the university;
- to participate in projects, lectures and other events held at the initiative of the University together with domestic and foreign experts, experts in various fields of activity.

The international dimension of PhD programmes of Russian universities is provided by: development of language training; development of international relations in the preparation of students and export of educational services; participation in international research activities; ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.

**In Tajik universities** while providing the experiments the PhD students visit the industry and provide their experiments. All teachers and PhD students widely use ICT, which is not limited but includes: power-point presentation, MS office, electronic board, virtual laboratory. In their curricula, the international element is not shown as a mandatory but it can be negotiated. Fortunately, PhD students participate at the conferences, workshops and other activities which is carried out across the border. Publish their articles and communicate with relevant staff at foreign countries` universities.

## Analysis of PhD and teacher training programmes

### Results – Teacher training programmes

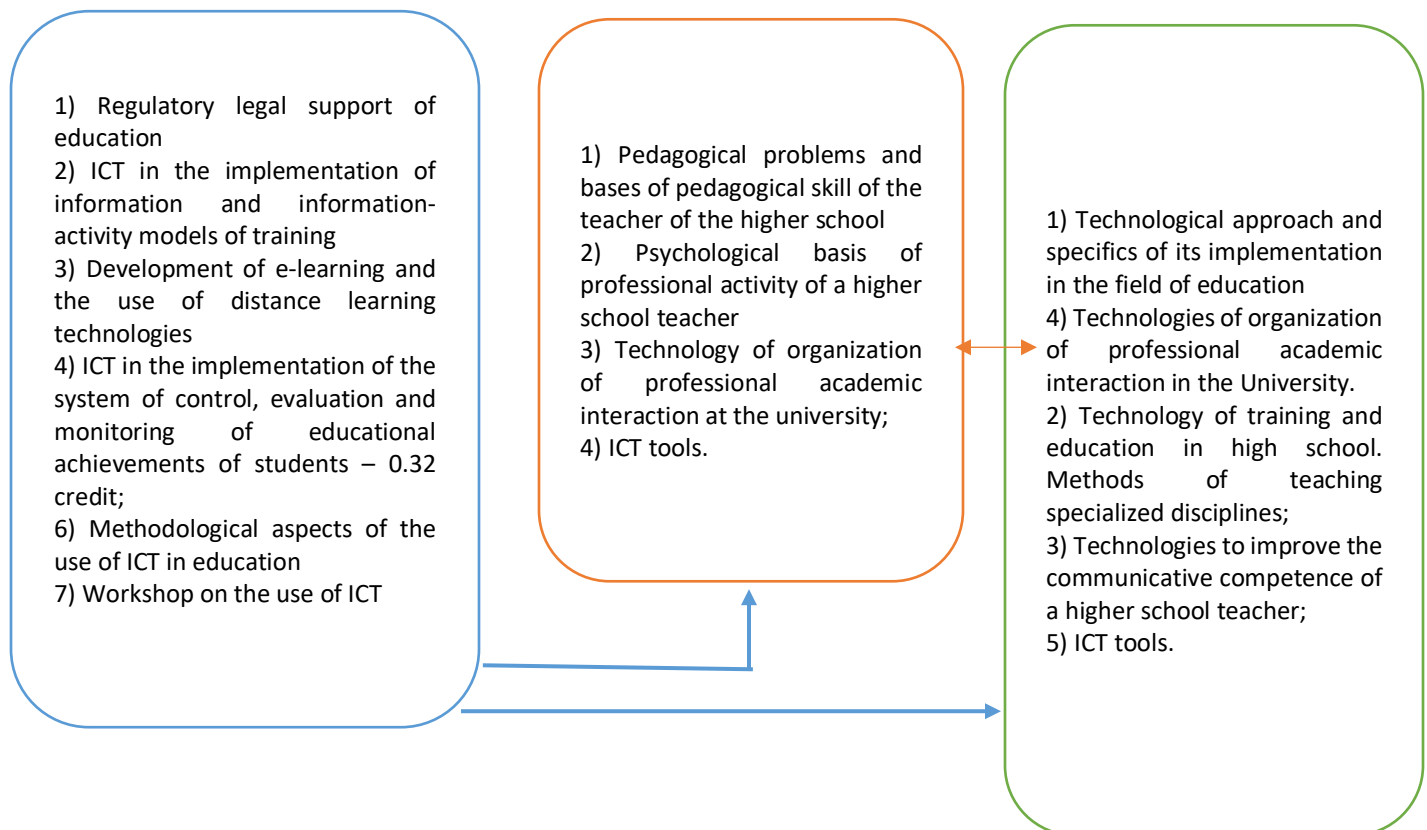
Teacher enhancement system in Tajikistan is mostly destroyed and Tajik universities didn't provide any information for analysis. In Russia teacher enhancement training is both obligatory and decentralized. Each teacher should take at least one teacher enhancement programme every 3 year. Otherwise it would not be possible to prolong the employment contract. The duration and contents of the courses are not specified. But teacher enhancement programmes are not subject to state accreditation and no federal standards are issued for them. So each university decide on the number, contents and duration of the teacher enhancement programmes they offer. Four Russian universities show different cases of teacher enhancement system. Four universities allowed us to identify three different models of teacher enhancement system existing in Russian universities – “Temple”, “Target” and “Pool”.

#### CASE 1 – Temple (MRSU and MGSU)

Model of teacher enhancement “Temple” has following specific features:

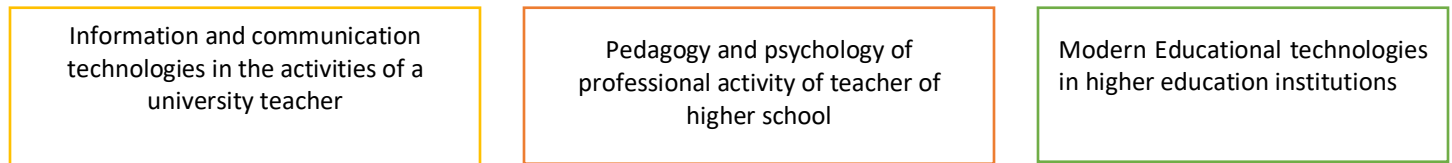
- set of short teacher training courses are offered;
- courses are focused on pedagogical, methodological and psychological aspects of higher education and seek to enhance general teaching competences of teachers majoring in different areas of study;
- courses are complementing each other, have common or topics and could be united in one large course, at the same time – courses could be taken independently, there is no introduction course;
- model allows enhance teaching competences of all teachers and thus has broad scope of target audience.

**For example, MRSU** offers three teacher enhancement programmes in three different aspect of pedagogy – ICT tools in higher education, fundamentals of pedagogy and psychology, modern education technologies. They complement each other and could be used as a module for the longer training programme. At the same time implementation of ICT tools is trained in each programme. It shows the most important competence of teacher identified in MRSU. The contents and the links between three programmes are described in the Figure.



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### Analysis of PhD and teacher training programmes



**Figure 2. Contents and links between teacher enhancement programmes at MRSU**

The programmes lack themes in such issues as curriculum design and assessment tools, project based and research-based learning, active learning, student-centered approach, foreign languages and teaching strategy development.

ICT tools, e-learning and distance learning are the most up-to-date and practical issues offered for the experienced teachers. Other topics represents the traditional academic pedagogy and psychology of higher education.

#### CASE 2 – Pool (BMSTU)

Model of teacher enhancement “Pool” has following specific features:

- one major teacher training courses is offered;
- courses include multiple modules covering different and sometimes not coherent issues including organization of education process, teaching methods, medical and psychological support of students, intercultural communication methods, academic writing skills and other;
- course design doesn’t suppose any entering requirements for teachers and it is supposed that each teacher will find something useful in the course while some of the modules could be not relevant for them.

BMSTU offer one major course of teacher enhancement for teachers of all fields of study. The contents of the course is divided in two blocks. **“Basic (compulsory)” part** (16 academic hours) include the following modules:

- The legal basis of the daily activities of the teacher. Anti-corruption in education.
- Prevention of extremism and terrorism penetration into the educational environment
- Formation of electronic information and educational environment (IOS).
- Local regulations of educational activities of the University
- Writing an article in a peer-reviewed journal.
- First aid.
- Designing educational literature in the MSTU. N. Uh. Bauman
- Documentary support of the implementation of the main educational programmes of the University

Second part is variable and open for teachers to choose relevant topics (20 academic hours). Teacher can take several modules out of the variable part. It includes the following modules:

- Organization of medical services at the University
- Issues of patent protection of intellectual property
- Training to improve the skills of public speaking teacher. Presentation secrets
- Training on business etiquette. The image of a teacher
- Information security
- The theory of inventive problem solving (TRIZ)
- Work with the electronic library of the University and third-party libraries. Publication activity
- Modern requirements of publishers to writing abstracts for scientific articles in English
- Modern technologies and equipment for 3D modelling and rapid prototyping to improve the visibility of the educational process
- Development of the ability to learn. Psychology of educational activity
- Practical work with e-University - Current academic performance
- Practical work with "Electronic University" - Library of academic disciplines, Curricula
- Organizational and methodological support of postgraduate training at the University
- The use of technical means of training (TCO) during interactive sessions
- Basic computer training (Windows, Office)
- Work in WORD and EXCEL for intermediate users

## Analysis of PhD and teacher training programmes

- Experience of working in MATLAB
- Working with INVENTOR (Basic and advanced courses)
- Basics of working in SOLID WORKS
- Basics of working in the EULER software package
- Creating illustrations (Adobe Photoshop, Illustrator)
- Theory of artificial neural networks
- The concept of modern natural science
- Optimization method
- Psychological aspects of engineering activity
- Communication theory (in English or French.)
- Psychology of higher education (practical classes)
- Comparative analysis of CAD packages (12 hours)
- Basics of working in the EULER software package
- Design of equipment with the help of arm WinMachine
- Works with AUTOCAD (Basic and advanced courses)
- Experience of working in SIEMENS NX

### CASE 3 – Target (NMSTU)

Model of teacher enhancement “Target” has following specific features:

- set of short teacher training courses is offered;
- courses are focused on specific professional field (like human resources management or lighting engineering) and has no interconnection. General pedagogic or psychological issues are not covered;
- each course has its own target groups of customers and professional skills of university teachers are regarded as more important than general teaching or research skills.





## Analysis of PhD and teacher training programmes

### Discussions and Recommendations

The report developed in this part of the project had the intention to present a comparative analysis of the practices in teacher training and re-training (with focus on teaching engineering disciplines) in Russian and Tajik universities. Teacher training includes two parts – initial training future teachers receive while studying in PhD programme and second part is retraining they get while working at the university through teacher enhancement programmes. Data collection intended to cover selected PhD and teacher training programmes information concerning its contents, course structure, learning outcomes, applied teaching tools, international dimension and involvement of industrial partners.

The contextual background allowed to identify the similar structure of the PhD education in Russia and Tajikistan, although in Russia PhD programmes are aligned with Bologna system and is regarded as higher education of 3rd Cycle and in Tajikistan the traditional Soviet system remains where PhD programmes are training of higher qualified research and teaching staff which is regarded as post-higher education.

Teacher enhancement system in Tajikistan is mostly destroyed and Tajik universities didn't provide any information for analysis. In Russia teacher enhancement training is both obligatory and decentralized. Each teacher should take at least one teacher enhancement programme every 3 year. Otherwise it would not be possible to prolong the employment contract. The duration and contents of the courses are not specified. But teacher enhancement programmes are not subject to state accreditation and no federal standards are issued for them. So, each university decide on the number, contents and duration of the teacher enhancement programmes they offer.

Results of study allows to give several recommendations.

**Recommendation 1:** Develop networking in university teacher training and re-training system to create joint flexible courses and programmes. Analysis revealed that each university has different approaches to teacher training and re-training focusing on the specific areas of study. Networking between partner and programme countries universities could help to joint efforts and achieve synergy effect in development and delivery of fully-fledged training and re-training programmes for teachers. Network would allow each university to excel in selected area thus improving quality of the whole programme. Involvement of foreign partners could provide international dimension to the programme.

**Recommendation 2:** Develop university teacher model of competences with descriptor of learning outcomes for the teacher of engineering disciplines. The competences on teaching used in PhD programmes are standard (in Russian universities) but at the same are very vague and general. It confuses all stakeholders about the real competences university teacher should possess. That is why there are significant differences between universities in description of these competences and learning outcomes achieved. On one hand, it allows to achieve diversity in teacher training approaches but on the other hand it decreases the compatibility and portability of teaching competences, decreases opportunities for PhD student mobility and recognition of periods of study in other university, confronts the rights of student for the quality education.

University teacher model of competences could be used also for design of teacher enhancement programmes. It would help to increase the continuity of teacher training and improve career opportunities.

**Recommendation 3:** Introduce modular approach to teacher training and re-training programmes. Each university offer several (some of them offer dozens of) PhD and teacher enhancement programmes where set of competences could vary as well as duration of the programme/course. The modular approach could provide flexibility and scalability of the programmes/courses, design tailor-made courses and create network joint programmes with partners. Analysis of teaching competences and real contents of the programmes/courses allowed to identify basic modules to be developed: Project Based Learning (PBL), E-learning and ICT Tools, Foreign Languages for Engineering + Academic Writing, Research Based Learning (PhD Students), Active Learning Strategies, Curriculum Design and Development, Assessment, Design thinking, Communication.

**Recommendation 4:** Teacher enhancement programmes should be designed according to the current needs of university teachers and according with their real level of teaching competences. For different levels of teaching competences different courses should be offered because it is not efficient to offer the same course for the teachers with different teaching experience.

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Also, different courses should be offered for the teachers from different fields of study, because teaching tools in engineering disciplines are significantly different from those applied in humanities and arts.

**Recommendation 5:** Specific course or module on “English for specific purposes” for teachers should be designed and offered because in the highly internationalized scientific environment teachers without good command of English language tend to lose professional qualification, gain recognition, publish research, study best practices and help students to adapt their skills to international job market. One of the opportunities to offer such courses is to establish joint or network teacher enhancement programmes with partner universities.

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## Analysis of PhD and teacher training programmes

### Appendix 1 – Outcome 1.1 MGSU, Moscow, Russia

In this Appendix it is possible to find two Programmes for the Outcomes 1.1., done by Moscow State University of Civil Engineering, Moscow, Russia. The monitoring results of University’s practices in teacher training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

#### Monitoring of PhD students training Programme “Architecture”

Project EXTEND 586060	MGSU
Programme name (profile and area of study of educational programme) Architecture	
The total number of full-time students (statistics over 3 years)	10 as an average over 3 years
The total number of part-time students (statistics over 3 years)	2 as an average
How many students are enrolled annually?	10, 13, 13 – last three years
Programme name (profile and area of study of educational programme) Equipment and building technologies	
The total number of full-time students (statistics over 3 years)	65 as an average over 3 years
The total number of part-time students (statistics over 3 years)	7 as an average
How many students are enrolled annually?	55, 75, 88 – last three years
Programme name (profile and area of study of educational programme) Computer science and computer facilities	
The total number of full-time students (statistics over 3 years)	8 as an average over 3 years
The total number of part-time students (statistics over 3 years)	0 as an average
How many students are enrolled annually?	8, 8, 8 – last three years
Programme name (profile and area of study of educational programme) Mechanical engineering	
The total number of full-time students (statistics over 3 years)	2 as an average over 3 years
The total number of part-time students (statistics over 3 years)	0 as an average
How many students are enrolled annually?	3, 1, 1 – last three years
Programme name (profile and area of study of educational programme) Management in technical systems	

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The total number of full-time students (statistics over 3 years)	1 as an average over 3 years
The total number of part-time students (statistics over 3 years)	0 as an average
How many students are enrolled annually?	1, 1, 2 – last three years
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	
If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.	Lectures, laboratory and practical lessons, heading lessons with students, taking a part in development of learning and methodical materials for their subject, taking a part in a current control and certification.
How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?	
List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).	
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	
Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	Lectures, laboratory and practical lessons, heading lessons with students, taking a part in development of learning and methodical materials for their subject, taking a part in a current control and certification.  The head of a structural department is in charge of organization.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	
What ICT tools are being used in the programme?	
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	

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The center of additional professional education is created in MGSU. It is the place where programmes of skills' development are been realized for specialists including teachers. Own courses for skills' development are created in MGSU in a sphere of education technologies. Education and methodical department is responsible for these courses. MGSU renews them every 3 years. Learners' knowledge is been estimated after taking these courses by testing on personal computers. Plan of skills' development is been compiled annually based on requests from departments. Every professor should take a course of skills' development once per three years, it is been fixed in his/her personal plan. The department's authority approves the personal plan for common skills' development. Two most popular programmes among professors are "Electronic educational technologies: Electronic information and educational environment" and "Modern informational and analytics tools in higher school professor's activities".

№	Programme title	Format of education	# of ac. hours	# of learners		
				2016	2017	2018
1	2	3	4	5	6	7
1	Methods of development, formation, approval and implementation of basic professional educational programmes of higher education	Face-to-face	40	166	-	-
2	Electronic educational technologies. Electronic information and educational environment	Face-to-face	72	56	154	28
3	Organization of the educational process.	Face-to-face	40	-	-	114
4	Educational and methodical support of basic professional educational programmes of higher education	Face-to-face	36	-	-	63
5	Modern information and analytical tools in the work of a teacher of higher education	Face-to-face	16	-	-	505
<b>Total</b>				<b>222</b>	<b>154</b>	<b>710</b>

### Monitoring of teacher training Programme "Modern information and analytical tools in the work of a teacher of higher education"

Project EXTEND 586060	Moscow State University of Civil Engineering
Programme name and it's duration in hours/credits Modern information and analytical tools in the work of a teacher of higher education	
The total number of learners completed programme (statistics over 3 years)	505
How many teachers are enrolled annually?	505
Structure of the teacher training programme (list of topics/themes with credits)	
List of topics/themes activities with credit hours	Modern informational and analytics tools in higher school professor's activities.
Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio	Informational technologies in science and education (4 hours of lectures); Organization of professor's working place (2 hours of lectures and 2 hours of practical lessons);

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	Representations of graphic illustrative material in the professor's educational activities with usage of information technologies (2 hours of lectures, 2 hours of practical lessons, 6 hours of seminar lessons).
List of learning outcomes in the programme.	<p>Having an idea:</p> <ul style="list-style-type: none"> <li>- about programme products for education;</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- of a specific application that make up the structure of an information space of university;</li> </ul> <p>Skills:</p> <ul style="list-style-type: none"> <li>- of organization a computerized teacher's workplace using an interactive whiteboard</li> </ul>
How do you measure learning outcomes? List and give short description of how learning outcomes are being assessed, including final assessment.	A credit by testing
Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?	Mostly used lectures, less often seminars. The usage of active methods is very low.
How many teachers deliver the course and what is their expertise.	Each course is authors. The specialists of the relevant departments: Educational and methodical management, Center of educational technologies, Center of educational standards and programmes, Center of educational process.
Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	Portal dot.mgsu.ru, smart board, e-teaching materials, presentations, usage of scientific-technical library
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	Certificate of professional development. It has practical value, because it allows to perform methodical work at the proper level. Passage of these courses is a prerequisite for the implementation of the annual effective contract.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	No data
What ICT tools are being used in the programme?	No data
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Development of language training; development of international relations in the preparation of students and export of educational services; participation in international research activities; ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.

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## Analysis of PhD and teacher training programmes

### Appendix 2 – Outcome 1.1 BMSTU, Moscow, Russia

In this Appendix it is possible to find the whole set of Outcomes 1.1. done by Bauman State Technical University, Moscow, Russia. The monitoring of University’s practices in PhD students’ and teacher’s training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

#### Monitoring of PhD Programme “Computer science and engineering”

Project EXTEND 586060	Bauman Moscow State Technical University
Programme name (profile and area of study of educational programme) 09.06.01 Computer science and engineering	
The total number of full-time students (statistics over 3 years)	15
The total number of part-time students (statistics over 3 years)	-
How many students are enrolled annually?	5
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>Block 1 " Disciplines (modules)", which includes disciplines (modules) related to the basic part of the programme and discipline (modules) related to variable part. This block work load is 30 ECTS, with 9 assigned to basic part</p> <p>History and philosophy of science – 4 ECTS</p> <p>Foreign Language – 5 ECTS and 21 – to variable part.</p> <p>Organizational and methodological support of the preparation and defence of a thesis – 1 ECTS</p> <p>Fundamentals of pedagogy and psychology of higher education - 6 ECTS</p> <p>Communicative and stylistic features of oral and written scientific speech – 1 ECTS</p> <p>Management and innovation infrastructure – 3 ECTS</p> <p>The optional discipline and elective courses in accordance with the scientific specialty, which is included in this area – 10 ECTS</p> <p>Block 2 "Internship", which fully refers to the variable part of the programme. This part includes internships to obtain professional skills and experience (including obligatory teaching internship)</p> <p>Block 3 "Research", which fully refers to the variable part of the programme. Block 3 and Block 2 work load is 201 ECTS. Block 3 includes research activities and preparation of scientific qualification work (dissertation) for the degree of Candidate of Sciences.</p> <p>Block 3 and block 3 workload is 201 ECTS.</p> <p>Block 4 "State final attestation", which fully refers to the basic part of the programme (workload is 9 ECTS) and ends with the award of the qualification "Researcher.</p>



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<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>General professional competence (GPC-8) Readiness for teaching on the educational programmes of higher education</p> <p>Know: fundamentals of teaching in higher education, the basics of psychology</p> <p>Able to: increase students 'interest in educational activities and those problems that are included in the content of the course, raise the effectiveness of training, to form students' practical skills through the practical oriented teaching, to create conditions for the formation of the professional thinking of the student, developing communication skills</p> <p>Possess skills in teaching technology, which includes a variety of methods, techniques, tools</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Type of control:</p> <p>the current control of progress is carried out mainly in the form of evaluation of materials prepared for lectures, seminars and other forms of educational activities;</p> <p>interim evaluation is carried out mainly in the form of open classes conducted by PhD students, the content of which is independently developed by PhD students;</p> <p>exams are carried out mainly in the form of presentation of the teaching materials on discipline developed by PhD students.</p> <p>final state attestation is carried out the form of candidate examinations in compulsory subjects of the curriculum in the form of individual interview.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Fundamentals of pedagogy and psychology of higher education 6 ECTS</p> <p>Pedagogical Practice (3 ECTS)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>A1 Overview and experience of the use of modern educational technologies in higher education; modernization of traditional types of training</p> <p>A2 Active educational technology; project-based learning</p> <p>A3 E-learning; new organizational and technological formats of educational activities</p> <p>B2 Self-Improvement of the person as one of the bases of achievement of tops of creative potential; pedagogical experience as result and a support of self-realization of creative potential of the teacher</p> <p>B3 Pedagogical skills – the highest level of professionalism of the teacher; preparation of classroom with the use of techniques of rhetoric and public speaking</p>

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## Analysis of PhD and teacher training programmes

	<p>C1 Modern requirements to the European engineer according to the concept of sustainable development; history of formation and development of technical education in Russia</p> <p>C2 History of foreign engineering education; modern trends in the development of higher technical education in Russia and abroad.</p> <p>C3 Comparative analysis of foreign systems of higher education; subject "Engineering pedagogy", its place and role in the system of pedagogical science</p> <p>C4 Social expectations concerning qualities of graduate of higher technical school; professional requirements to the teacher of higher school.</p> <p>C5 Structure of activity of the teacher of the higher school; theoretical bases of a technique of teaching at the higher school</p> <p style="padding-left: 40px;">B1 Psychology of higher education; components of professionalism and behavior and activities (group dynamics, group norm)</p> <p>C6 Requirements for modern educational technologies in relation to the motivation of the educational situation; organizational forms and content of training at the University</p> <p>C7 Modular system of training, design goals and content of the curriculum; practical use of the properties of the material for the preparation of training sessions and presentations</p> <p>C8 Methods of preparation and control measures, methods of evaluation of the teacher, professional culture of the engineer</p> <p>C9 the Culture of high school teacher as a necessary component of educational process</p> <p>D1 Dynamics of mental development (childhood, adolescence and youth)</p> <p>D2 Dynamics of mental development (adult psychology, old age); the role of the group in human behavior and activity (group structure, group processes)</p> <p>D3 Role of the group in human creative self-realization of the person</p> <p>D4 Role of the group in human behavior and activity (structure of psychological climate in the group); conscious communication in conflict situations (conflicts in different spheres of human interaction)</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Each PhD students' group has a tutor, who is in charge of conducting teaching internship. BMSTU has a special department that organizes and controls this kind of activity. The teaching internship includes the following steps:</p> <ul style="list-style-type: none"> <li>- getting an individual task;</li> <li>- introductory briefing;</li> <li>- analysis of individual tasks;</li> <li>- -study of new materials, methods, technologies;</li> <li>- conducting classes, developing training systems or writing teaching materials;</li> <li>- -preparation of the report on practice</li> </ul>

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## Analysis of PhD and teacher training programmes

<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises. Scientific research undertaken by PhD students is being used by industry actors. Industry representatives are conducting guest lectures at BMSTU.</p>
<p>What ICT tools are being used in the programme?</p>	<ul style="list-style-type: none"> <li>• Microsoft Office 2007 Suites (Communicator, Enterprise)</li> <li>• Microsoft Office Professional Plus 2010 (x86, x64)</li> <li>• Microsoft Project Professional 2010</li> <li>• Microsoft Visio Premium 2010 (x86, x64)</li> <li>• Microsoft Visio Professional 2013(x86, x64)</li> <li>• Microsoft Windows 7 (Enterprise x86, Enterprise x64, Professional x86, Professional x64)</li> <li>• Microsoft Windows 8 Professional (x86, x64)</li> <li>• Microsoft Windows 8.1 Professional (x86, x64)</li> <li>• Microsoft Windows Vista Business (x86)</li> <li>• Microsoft Windows XP Professional (x86, x64)</li> <li>• Microsoft Office Professional 2013 (x86, x64)</li> <li>• Microsoft Visual Studio 2012, 2013</li> <li>• Kaspersky Antivirus</li> <li>• Antivirus DrWeb 97</li> <li>• Microsoft SQL Server Standard Edition 2005</li> <li>• Microsoft SQL Server 2012 Standard Edition</li> <li>• Microsoft SQL Server 2005 Enterprise Edition</li> <li>• Microsoft SQL Server 2005 Developer Edition</li> <li>• Microsoft Server Std 2003 R2 SP2</li> <li>• Microsoft Server 2008 R2</li> <li>• Microsoft Server 2003 Enterprise R2</li> <li>• Microsoft ISA Server Std 2006</li> <li>• Microsoft Exchange Server Std 2007</li> <li>• ABBY FineReader 8.0, 9.0, 10.0 Corporate Edition</li> <li>• ABBY Lingvo 12, X3</li> <li>• Catia</li> <li>• Autodesk AutoCAD2010</li> <li>• Autodesk Inventor 2010</li> <li>• Mathcad 14</li> <li>• Mathworks R2012</li> <li>• ProEngineer</li> <li>• Siemens NX, NXNastran</li> <li>• SmarTeam</li> <li>• SolidWorks</li> </ul> <p>Electronic library of BMSTU "Yauza" provides graduate students with access to internal and external information resources. The</p>

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## Analysis of PhD and teacher training programmes

	<p>electronic catalogue, as an integral part of the electronic library, provides the implementation of reference and bibliographic and information services for graduate students. The electronic catalog contains more than 925 thousand records. Bibliographic records and full-text materials are available in the electronic catalogue.</p> <p>Actively used by graduate students access to external information resources in on-line mode: SPIE (Society of Photo-Optical instruments, Inc) Digital Library (magazines, conferences), Oxford University Press (magazines), American Institute of Physics (magazines), Sage Publications (magazines), Taylor &amp; Francis (magazines), Optical Society of America (magazines, conferences), scientometric abstract base SCOPUS, full-text-vye database publishing Springer, IEEE/IET library, Wiley.</p> <p>In the reading rooms of the library are freely accessible all of the latest issue of the national periodical publications received in the library - 462 title.</p> <p>Domestic electronic resources are represented by the following publications: full texts of all existing state Standards (VNIKI), Database "Science and technology in Russia", scientific electronic library - elibrary.ru, abs "LAN".</p> <p>In addition, graduate students of BMSTU have the opportunity to work with the following scientific electronic resources in the test mode: database of Economics and law polpred.com. ProQuest (dissertations, journals, books).</p> <p>BMSTU has access to the following specialized WEB-services: Ebsco Discovery Services, including a catalog and a search engine for all available information resources, including the catalog of the scientific and technical library of MSTU. N. Eh. Bauman.</p> <p>Ninety-eight A-to-Z and LinkSource from EBSCO (EBSCO, USA) is a specialized library web service that includes an electronic catalog of foreign scientific periodicals and allows you to follow the links in the search results to the full text of articles available from the IP-addresses of the University.</p> <p>The system of remote user authentication takes place through a single authentication center BMSTU Webvpn. Through this center is available in the all panotec-Stevie resources of the publishing house BMSTU and electronic University system.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<ul style="list-style-type: none"> <li>- Guest lecturers from partner-universities</li> <li>- International conferences</li> <li>- Development of language training;</li> <li>- ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.</li> </ul>

## Monitoring of PhD Programme “Nuclear, thermal and renewable energy and related technologies“

Project EXTEND 586060	Bauman Moscow State Technical University
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## Analysis of PhD and teacher training programmes

Programme name (profile and area of study of educational progr14.06.01 Nuclear, thermal and renewable energy and related technologies)	
The total number of full-time students (statistics over 3 years)	10
The total number of part-time students (statistics over 3 years)	-
How many students are enrolled annually?	3-4
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>Block 1 " Disciplines (modules)", which includes disciplines (modules) related to the basic part of the programme and discipline (modules) related to variable part. This block work load is 30 ECTS, with 9 assigned to basic part                      History and philosophy of science – 4 ECTS                      Foreign Language – 5 ECTS                      and 21 – to variable part.                      Organizational and methodological support of the preparation and defence of a thesis – 1 ECTS                      Fundamentals of pedagogy and psychology of higher education 6 ECTS                      Communicative and stylistic features of oral and written scientific speech – 1 ECTS                      Management and innovation infrastructure – 3 ECTS                      The optional discipline and elective courses in accordance with the scientific specialty, which is included in this area – 10 ECTS                      Block 2 "Internship", which fully refers to the variable part of the programme. This part includes internships to obtain professional skills and experience (including obligatory teaching internship)                      Block 3 "Research", which fully refers to the variable part of the programme. Block 3 and Block 2 work load is 201 ECTS. Block 3 includes research activities and preparation of scientific qualification work (dissertation) for the degree of Candidate of Sciences.                      Block 3 and block 3 workload is 201 ECTS.                      Block 4 "State final attestation", which fully refers to the basic part of the programme (workload is 9 ECTS) and ends with the award of the qualification "Researcher.</p>
If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.	<p>General Professional Competence (GPC-5) Readiness for teaching on the educational programmes of higher education                      Know: legal and regulatory framework of teaching in higher education                      To be ABLE to: select and implement effective teaching tools                      Possess technology of design of education process in higher education</p>
How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes	<p>Type of control:                      the current control of progress is carried out mainly in the form of evaluation of materials prepared for lectures, seminars and other forms of educational activities;</p>

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## Analysis of PhD and teacher training programmes

<p>connected to teaching activities are being assessed?</p>	<p>interim evaluation is carried out mainly in the form of open classes conducted by PhD students, the content of which is independently developed by PhD students;</p> <p>exams are carried out mainly in the form of presentation of the teaching materials on discipline developed by PhD students.</p> <p>final state attestation is carried out the form of candidate examinations in compulsory subjects of the curriculum in the form of individual interview.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Fundamentals of pedagogy and psychology of higher education 6 ECTS</p> <p>Pedagogical Practice (3 ECTS)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>A1 Overview and experience of the use of modern educational technologies in higher education; modernization of traditional types of training</p> <p>A2 Active educational technology; project-based learning</p> <p>A3 E-learning; new organizational and technological formats of educational activities</p> <p>B2 Self-Improvement of the person as one of the bases of achievement of tops of creative potential; pedagogical experience as result and a support of self-realization of creative potential of the teacher</p> <p>B3 Pedagogical skills – the highest level of professionalism of the teacher; preparation of classroom with the use of techniques of rhetoric and public speaking</p> <p>C1 Modern requirements to the European engineer according to the concept of sustainable development; history of formation and development of technical education in Russia</p> <p>C2 History of foreign engineering education; modern trends in the development of higher technical education in Russia and abroad.</p> <p>C3 Comparative analysis of foreign systems of higher education; subject "Engineering pedagogy", its place and role in the system of pedagogical science</p> <p>C4 Social expectations concerning qualities of graduate of higher technical school; professional requirements to the teacher of higher school.</p> <p>C5 Structure of activity of the teacher of the higher school; theoretical bases of a technique of teaching at the higher school</p> <p>B1 Psychology of higher education; components of professionalism and behavior and activities (group dynamics, group norms)</p>

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**Analysis of PhD and teacher training programmes**

	<p>C6 Requirements for modern educational technologies in relation to the motivation of the educational situation; organizational forms and content of training at the University</p> <p>C7 Modular system of training, design goals and content of the curriculum; practical use of the properties of the material for the preparation of training sessions and presentations</p> <p>C8 Methods of preparation and control measures, methods of evaluation of the teacher, professional culture of the engineer</p> <p>C9 the Culture of high school teacher as a necessary component of educational process</p> <p>D1 Dynamics of mental development (childhood, adolescence and youth)</p> <p>D2 Dynamics of mental development (adult psychology, old age); the role of the group in human behavior and activity (group structure, group processes)</p> <p>D3 Role of the group in human creative self-realization of the person</p> <p>D4 Role of the group in human behavior and activity (structure of psychological climate in the group); conscious communication in conflict situations (conflicts in different spheres of human interaction)</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Each PhD students' group has a tutor, who is in charge of conducting teaching internship. BMSTU has a special department that organizes and controls this kind of activity. The teaching internship includes the following steps:</p> <ul style="list-style-type: none"> <li>- getting an individual task;</li> <li>- introductory briefing;</li> <li>- analysis of individual tasks;</li> <li>- study of new materials, methods, technologies;</li> <li>- conducting classes, developing training systems or writing teaching materials;</li> <li>- preparation of the report on practice</li> </ul>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises. Scientific research undertaken by PhD students is being used by industry actors. Industry representatives are conducting guest lectures at BMSTU.</p>
<p>What ICT tools are being used in the programme?</p>	<ul style="list-style-type: none"> <li>• Microsoft Office 2007 Suites (Communicator, Enterprise)</li> <li>• Microsoft Office Professional Plus 2010 (x86, x64)</li> <li>• Microsoft Project Professional 2010</li> <li>• Microsoft Visio Premium 2010 (x86, x64)</li> <li>• Microsoft Visio Professional 2013(x86, x64)</li> <li>• Microsoft Windows 7 (Enterprise x86, Enterprise x64, Professional x86, Professional x64)</li> <li>• Microsoft Windows 8 Professional (x86, x64)</li> </ul>

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## Analysis of PhD and teacher training programmes

	<ul style="list-style-type: none"> <li>• Microsoft Windows 8.1 Professional (x86, x64)</li> <li>• Microsoft Windows Vista Business (x86)</li> <li>• Microsoft Windows XP Professional (x86, x64)</li> <li>• Microsoft Office Professional 2013 (x86, x64)</li> <li>• Microsoft Visual Studio 2012, 2013</li> <li>• Kaspersky antivirus</li> <li>• Antivirus DrWeb 97</li> <li>• Microsoft SQL Server Standard Edition 2005</li> <li>• Microsoft SQL Server 2012 Standard Edition</li> <li>• Microsoft SQL Server 2005 Enterprise Edition</li> <li>• Microsoft SQL Server 2005 Developer Edition</li> <li>• Microsoft Server Std 2003 R2 SP2</li> <li>• Microsoft Server 2008 R2</li> <li>• Microsoft Server 2003 Enterprise R2</li> <li>• Microsoft ISA Server Std 2006</li> <li>• Microsoft Exchange Server Std 2007</li> <li>• ABBY FineReader 8.0, 9.0, 10.0 Corporate Edition</li> <li>• ABBY Lingvo 12, X3</li> <li>• Catia</li> <li>• Autodesk AutoCAD2010</li> <li>• Autodesk Inventor 2010</li> <li>• Mathcad 14</li> <li>• Mathworks R2012</li> <li>• ProEngineer</li> <li>• Siemens NX, NXNastran</li> <li>• SmarTeam</li> <li>• SolidWorks</li> </ul> <p>Electronic library of BMSTU "Yauza" provides graduate students with access to internal and external information resources. The electronic catalogue, as an integral part of the electronic library, provides the implementation of reference and bibliographic and information services for graduate students. The electronic catalog contains more than 925 thousand records. Bibliographic records and full-text materials are available in the electronic catalogue.</p> <p>Actively used by graduate students access to external information resources in on-line mode: SPIE (Society of Photo-Optical instruments, Inc) Digital Library (magazines, conferences), Oxford University Press (magazines), American Institute of Physics (magazines), Sage Publications (magazines), Taylor &amp; Francis (magazines), Optical Society of America (magazines, conferences), scientometric abstract base SCOPUS, full-text-vye database publishing Springer, IEEE/IET library, Wiley.</p>
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## Analysis of PhD and teacher training programmes

	<p>In the reading rooms of the library are freely accessible all of the latest issue of the national periodical publications received in the library - 462 title.</p> <p>Domestic electronic resources are represented by the following publications: full texts of all existing state Standards (VNIKI), Database "Science and technology in Russia", scientific electronic library - elibrary.ru, abs "LAN".</p> <p>In addition, graduate students of BMSTU have the opportunity to work with the following scientific electronic resources in the test mode: database of Economics and law polpred.com. ProQuest (dissertations, journals, books).</p> <p>BMSTU has access to the following specialized WEB-services: Ebsco Discovery Services, including a catalog and a search engine for all available information resources, including the catalog of the scientific and technical library of BMSTU</p> <p>Ninety-eight A-to-Z and LinkSource from EBSCO (EBSCO, USA) is a specialized library web service that includes an electronic catalog of foreign scientific periodicals and allows you to follow the links in the search results to the full text of articles available from the IP-addresses of the University.</p> <p>The system of remote user authentication takes place through a single authentication center BMSTU Webvpn. Through this center is available in the all panotec-Stevie resources of the publishing house BMSTU and electronic University system.</p>
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	<ul style="list-style-type: none"> <li>- Guest lecturers from partner-universities</li> <li>- International conferences</li> <li>- Development of language training;</li> <li>- ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.</li> </ul>

### Monitoring of PhD Programme “Mechanical Engineering”

Project EXTEND 586060	Bauman Moscow State Technical University
Programme name (profile and area of study of educational programme) 15.06.01 Mechanical Engineering	
The total number of full-time students (statistics over 3 years)	10
The total number of part-time students (statistics over 3 years)	-
How many students are enrolled annually?	3-4
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Block 1 " Disciplines (modules)", which includes disciplines (modules) related to the basic part of the programme and discipline (modules) related to variable part. This block work load is 30 ECTS, with 9 assigned to basic part

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## Analysis of PhD and teacher training programmes

	<p>History and philosophy of science – 4 ECTS Foreign Language – 5 ECTS and 21 – to variable part. Organizational and methodological support of the preparation and defence of a thesis – 1 ECTS Fundamentals of pedagogy and psychology of higher education 6 ECTS Communicative and stylistic features of oral and written scientific speech – 1 ECTS Management and innovation infrastructure – 3 ECTS The optional discipline and elective courses in accordance with the scientific specialty, which is included in this area – 10 ECTS Block 2 "Internship", which fully refers to the variable part of the programme. This part includes internships to obtain professional skills and experience (including obligatory teaching internship) Block 3 "Research", which fully refers to the variable part of the programme. Block 3 and Block 2 work load is 201 ECTS. Block 3 includes research activities and preparation of scientific qualification work (dissertation) for the degree of Candidate of Sciences. Block 3 and block 3 workload is 201 ECTS. Block 4 "State final attestation", which fully refers to the basic part of the programme (workload is 9 ECTS) and ends with the award of the qualification "Researcher.</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>General Professional Competence (GPC-8) Readiness for teaching on the educational programmes of higher education Know: the legal framework of teaching in higher education, the main trends in the field of mechanical engineering To be ABLE to: use the best methods of teaching, to select the material that characterizes the achievements of science, taking into account the specific field of study, possess skills technology of design of educational process of higher education, methods and technologies of interpersonal communication, skills of public speech taking into account specifics of the field of study</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Type of control: the current control of progress is carried out mainly in the form of evaluation of materials prepared for lectures, seminars and other forms of educational activities; interim evaluation is carried out mainly in the form of open classes conducted by PhD students, the content of which is independently developed by PhD students; exams are carried out mainly in the form of presentation of the teaching materials on discipline developed by PhD students. final state attestation is carried out the form of candidate examinations in compulsory subjects of the curriculum in the form of individual interview.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare</p>	<p>Fundamentals of pedagogy and psychology of higher education</p>

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<p>PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>6 ECTS Pedagogical Practice (18 ECTS)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>A1 Overview and experience of the use of modern educational technologies in higher education; modernization of traditional types of training A2 Active educational technology; project-based learning A3 E-learning; new organizational and technological formats of educational activities B2 Self-Improvement of the person as one of the bases of achievement of tops of creative potential; pedagogical experience as result and a support of self-realization of creative potential of the teacher B3 Pedagogical skills – the highest level of professionalism of the teacher; preparation of classroom with the use of techniques of rhetoric and public speaking C1 Modern requirements to the European engineer according to the concept of sustainable development; history of formation and development of technical education in Russia C2 History of foreign engineering education; modern trends in the development of higher technical education in Russia and abroad. C3 Comparative analysis of foreign systems of higher education; subject "Engineering pedagogy", its place and role in the system of pedagogical science C4 Social expectations concerning qualities of graduate of higher technical school; professional requirements to the teacher of higher school. C5 Structure of activity of the teacher of the higher school; theoretical bases of a technique of teaching at the higher school B1 Psychology of higher education; components of professionalism and behavior and activities (group dynamics, group norms) C6 Requirements for modern educational technologies in relation to the motivation of the educational situation; organizational forms and content of training at the University C7 Modular system of training, design goals and content of the curriculum; practical use of the properties of the material for the preparation of training sessions and presentations C8 Methods of preparation and control measures, methods of evaluation of the teacher, professional culture of the engineer C9 the Culture of high school teacher as a necessary component of educational process D1 Dynamics of mental development (childhood, adolescence and youth)</p>

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## Analysis of PhD and teacher training programmes

	<p>D2 Dynamics of mental development (adult psychology, old age); the role of the group in human behavior and activity (group structure, group processes)</p> <p>D3 Role of the group in human creative self-realization of the person</p> <p>D4 Role of the group in human behavior and activity (structure of psychological climate in the group); conscious communication in conflict situations (conflicts in different spheres of human interaction)</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Each PhD students' group has a tutor, who is in charge of conducting teaching internship. BMSTU has a special department that organizes and controls this kind of activity. The teaching internship includes the following steps:</p> <ul style="list-style-type: none"> <li>- getting an individual task;</li> <li>- introductory briefing;</li> <li>- analysis of individual tasks;</li> <li>- study of new materials, methods, technologies;</li> <li>- conducting classes, developing training systems or writing teaching materials;</li> <li>- preparation of the report on practice</li> </ul>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises. Scientific research undertaken by PhD students is being used by industry actors. Industry representatives are conducting guest lectures at BMSTU.</p>
<p>What ICT tools are being used in the programme?</p>	<ul style="list-style-type: none"> <li>• Microsoft Office 2007 Suites (Communicator, Enterprise)</li> <li>• Microsoft Office Professional Plus 2010 (x86, x64)</li> <li>• Microsoft Project Professional 2010</li> <li>• Microsoft Visio Premium 2010 (x86, x64)</li> <li>• Microsoft Visio Professional 2013(x86, x64)</li> <li>• Microsoft Windows 7 (Enterprise x86, Enterprise x64, Professional x86, Professional x64)</li> <li>• Microsoft Windows 8 Professional (x86, x64)</li> <li>• Microsoft Windows 8.1 Professional (x86, x64)</li> <li>• Microsoft Windows Vista Business (x86)</li> <li>• Microsoft Windows XP Professional (x86, x64)</li> <li>• Microsoft Office Professional 2013 (x86, x64)</li> <li>• Microsoft Visual Studio 2012, 2013</li> <li>• Kaspersky antivirus</li> <li>• Antivirus DrWeb97</li> <li>• Microsoft SQL Server Standard Edition 2005</li> <li>• Microsoft SQL Server 2012 Standard Edition</li> <li>• Microsoft SQL Server 2005 Enterprise Edition</li> <li>• Microsoft SQL Server 2005 Developer Edition</li> </ul>

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## Analysis of PhD and teacher training programmes

	<ul style="list-style-type: none"> <li>• Microsoft Server Std 2003 R2 SP2</li> <li>• Microsoft Server 2008 R2</li> <li>• Microsoft Server 2003 Enterprise R2</li> <li>• Microsoft ISA Server Std 2006</li> <li>• Microsoft Exchange Server Std 2007</li> <li>• ABBY FineReader 8.0, 9.0, 10.0 Corporate Edition</li> <li>• ABBY Lingvo 12, X3</li> <li>• Catia</li> <li>• Autodesk AutoCAD2010</li> <li>• Autodesk Inventor 2010</li> <li>• Mathcad 14</li> <li>• Mathworks R2012</li> <li>• ProEngineer</li> <li>• Siemens NX, NXNastran</li> <li>• SmarTeam</li> <li>• SolidWorks</li> </ul> <p>Electronic library of BMSTU "Yauza" provides graduate students with access to internal and external information resources. The electronic catalogue, as an integral part of the electronic library, provides the implementation of reference and bibliographic and information services for graduate students. The electronic catalog contains more than 925 thousand records. Bibliographic records and full-text materials are available in the electronic catalogue.</p> <p>Actively used by graduate students access to external information resources in on-line mode: SPIE (Society of Photo-Optical instruments, Inc) Digital Library (magazines, conferences), Oxford University Press (magazines), American Institute of Physics (magazines), Sage Publications (magazines), Taylor &amp; Francis (magazines), Optical Society of America (magazines, conferences), scientometric abstract base SCOPUS, full-text-vye database publishing Springer, IEEE/IET library, Wiley.</p> <p>In the reading rooms of the library are freely accessible all of the latest issue of the national periodical publications received in the library - 462 title.</p> <p>Domestic electronic resources are represented by the following publications: full texts of all existing state Standards (VNIKI), Database "Science and technology in Russia", scientific electronic library - elibrary.ru, abs "LAN".</p> <p>In addition, graduate students of BMSTU have the opportunity to work with the following scientific electronic resources in the test mode: database of Economics and law polpred.com. ProQuest (dissertations, journals, books).</p> <p>BMSTU has access to the following specialized WEB-services: Ebsco Discovery Services, including a catalog and a search engine for all</p>
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## Analysis of PhD and teacher training programmes

	<p>available information resources, including the catalog of the scientific and technical library of BMSTU.</p> <p>Ninety-eight A-to-Z and LinkSource from EBSCO (EBSCO, USA) is a specialized library web service that includes an electronic catalog of foreign scientific periodicals and allows you to follow the links in the search results to the full text of articles available from the IP-addresses of the University.</p> <p>The system of remote user authentication takes place through a single authentication center BMSTU Webvpn. Through this center is available in the all panotec-Stevie resources of the publishing house BMSTU and electronic University system.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<ul style="list-style-type: none"> <li>- Guest lecturers from partner-universities</li> <li>- International conferences</li> <li>- Development of language training;</li> <li>- ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.”</li> </ul>

## Monitoring of PhD Programme “Aviation and rocket and space technology “

Project EXTEND 586060	Bauman Moscow State Technical University
<p>Programme name (profile and area of study of educational programme)</p> <p>24.06.01 Aviation and rocket and space technology</p>	
The total number of full-time students (statistics over 3 years)	20
The total number of part-time students (statistics over 3 years)	-
How many students are enrolled annually?	5-6
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>Block 1 " Disciplines (modules)", which includes disciplines (modules) related to the basic part of the programme and discipline (modules) related to variable part. This block work load is 30 ECTS, with 9 assigned to basic part</p> <p>History and philosophy of science – 4 ECTS</p> <p>Foreign Language – 5 ECTS</p> <p>and 21 – to variable part.</p> <p>Organizational and methodological support of the preparation and defence of a thesis – 1 ECTS</p> <p>Fundamentals of pedagogy and psychology of higher education 6 ECTS</p> <p>Communicative and stylistic features of oral and written scientific speech – 1 ECTS</p> <p>Management and innovation infrastructure – 3 ECTS</p> <p>The optional discipline and elective courses in accordance with the scientific specialty, which is included in this area – 10 ECTS</p>

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	<p>Block 2 "Internship", which fully refers to the variable part of the programme. This part includes internships to obtain professional skills and experience (including obligatory teaching internship)</p> <p>Block 3 "Research", which fully refers to the variable part of the programme. Block 3 and Block 2 work load is 201 ECTS. Block 3 includes research activities and preparation of scientific qualification work (dissertation) for the degree of Candidate of Sciences.</p> <p>Block 3 and block 3 workload is 201 ECTS.</p> <p>Block 4 "State final attestation", which fully refers to the basic part of the programme (workload is 9 ECTS) and ends with the award of the qualification "Researcher."</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>No data</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>No data</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Fundamentals of pedagogy and psychology of higher education 6 ECTS</p> <p>Pedagogical Practice (18 ECTS)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>A1 Overview and experience of the use of modern educational technologies in higher education; modernization of traditional types of training</p> <p>A2 Active educational technology; project-based learning</p> <p>A3 E-learning; new organizational and technological formats of educational activities</p> <p>B2 Self-Improvement of the person as one of the bases of achievement of tops of creative potential; pedagogical experience as result and a support of self-realization of creative potential of the teacher</p> <p>B3 Pedagogical skills – the highest level of professionalism of the teacher; preparation of classroom with the use of techniques of rhetoric and public speaking</p> <p>C1 Modern requirements to the European engineer according to the concept of sustainable development; history of formation and development of technical education in Russia</p>

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	<p>C2 History of foreign engineering education; modern trends in the development of higher technical education in Russia and abroad.</p> <p>C3 Comparative analysis of foreign systems of higher education; subject "Engineering pedagogy", its place and role in the system of pedagogical science</p> <p>C4 Social expectations concerning qualities of graduate of higher technical school; professional requirements to the teacher of higher school.</p> <p>C5 Structure of activity of the teacher of the higher school; theoretical bases of a technique of teaching at the higher school</p> <p>B1 Psychology of higher education; components of professionalism and behavior and activities (group dynamics, group norms)</p> <p>C6 Requirements for modern educational technologies in relation to the motivation of the educational situation; organizational forms and content of training at the University</p> <p>C7 Modular system of training, design goals and content of the curriculum; practical use of the properties of the material for the preparation of training sessions and presentations</p> <p>C8 Methods of preparation and control measures, methods of evaluation of the teacher, professional culture of the engineer</p> <p>C9 the Culture of high school teacher as a necessary component of educational process</p> <p>D1 Dynamics of mental development (childhood, adolescence and youth)</p> <p>D2 Dynamics of mental development (adult psychology, old age); the role of the group in human behavior and activity (group structure, group processes)</p> <p>D3 Role of the group in human creative self-realization of the person</p> <p>D4 Role of the group in human behavior and activity (structure of psychological climate in the group); conscious communication in conflict situations (conflicts in different spheres of human interaction)</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Each PhD students' group has a tutor, who is in charge of conducting teaching internship. BMSTU has a special department that organizes and controls this kind of activity. The teaching internship includes the following steps:</p> <ul style="list-style-type: none"> <li>- getting an individual task;</li> <li>- introductory briefing;</li> <li>- analysis of individual tasks;</li> <li>- study of new materials, methods, technologies;</li> <li>- conducting classes, developing training systems or writing teaching materials;</li> <li>- preparation of the report on practice</li> </ul>



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## Analysis of PhD and teacher training programmes

<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises. Scientific research undertaken by PhD students is being used by industry actors. Industry representatives are conducting guest lectures at BMSTU.</p>
<p>What ICT tools are being used in the programme?</p>	<ul style="list-style-type: none"> <li>• Microsoft Office 2007 Suites (Communicator, Enterprise)</li> <li>• Microsoft Office Professional Plus 2010 (x86, x64)</li> <li>• Microsoft Project Professional 2010</li> <li>• Microsoft Visio Premium 2010 (x86, x64)</li> <li>• Microsoft Visio Professional 2013(x86, x64)</li> <li>• Microsoft Windows 7 (Enterprise x86, Enterprise x64, Professional x86, Professional x64)</li> <li>• Microsoft Windows 8 Professional (x86, x64)</li> <li>• Microsoft Windows 8.1 Professional (x86, x64)</li> <li>• Microsoft Windows Vista Business (x86)</li> <li>• Microsoft Windows XP Professional (x86, x64)</li> <li>• Microsoft Office Professional 2013 (x86, x64)</li> <li>• Microsoft Visual Studio 2012, 2013</li> <li>• Kaspersky antivirus</li> <li>• Antivirus DrWeb97</li> <li>• Microsoft SQL Server Standard Edition 2005</li> <li>• Microsoft SQL Server 2012 Standard Edition</li> <li>• Microsoft SQL Server 2005 Enterprise Edition</li> <li>• Microsoft SQL Server 2005 Developer Edition</li> <li>• Microsoft Server Std 2003 R2 SP2</li> <li>• Microsoft Server 2008 R2</li> <li>• Microsoft Server 2003 Enterprise R2</li> <li>• Microsoft ISA Server Std 2006</li> <li>• Microsoft Exchange Server Std 2007</li> <li>• ABBY FineReader 8.0, 9.0, 10.0 Corporate Edition</li> <li>• ABBY Lingvo 12, X3</li> <li>• Catia</li> <li>• Autodesk AutoCAD2010</li> <li>• Autodesk Inventor 2010</li> <li>• Mathcad 14</li> <li>• Mathworks R2012</li> <li>• ProEngineer</li> <li>• Siemens NX, NXNastran</li> <li>• SmarTeam</li> <li>• SolidWorks</li> </ul> <p>Electronic library of BMSTU "Yauza" provides graduate students with access to internal and external information resources. The</p>

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## Analysis of PhD and teacher training programmes

	<p>electronic catalogue, as an integral part of the electronic library, provides the implementation of reference and bibliographic and information services for graduate students. The electronic catalog contains more than 925 thousand records. Bibliographic records and full-text materials are available in the electronic catalogue.</p> <p>Actively used by graduate students access to external information resources in on-line mode: SPIE (Society of Photo-Optical instruments, Inc) Digital Library (magazines, conferences), Oxford University Press (magazines), American Institute of Physics (magazines), Sage Publications (magazines), Taylor &amp; Francis (magazines), Optical Society of America (magazines, conferences), scientometric abstract base SCOPUS, full-text-vye database publishing Springer, IEEE/IET library, Wiley.</p> <p>In the reading rooms of the library are freely accessible all of the latest issue of the national periodical publications received in the library - 462 title.</p> <p>Domestic electronic resources are represented by the following publications: full texts of all existing state Standards (VNIKI), Database "Science and technology in Russia", scientific electronic library - elibrary.ru, abs "LAN".</p> <p>In addition, graduate students of BMSTU have the opportunity to work with the following scientific electronic resources in the test mode: database of Economics and law polpred.com. ProQuest (dissertations, journals, books).</p> <p>BMSTU has access to the following specialized WEB-services: Ebsco Discovery Services, including a catalog and a search engine for all available information resources, including the catalog of the scientific and technical library of BMSTU.</p> <p>Ninety-eight A-to-Z and LinkSource from EBSCO (EBSCO, USA) is a specialized library web service that includes an electronic catalog of foreign scientific periodicals and allows you to follow the links in the search results to the full text of articles available from the IP-addresses of the University.</p> <p>The system of remote user authentication takes place through a single authentication center BMSTU Webvpn. Through this center is available in the all panotec-Stevie resources of the publishing house BMSTU and electronic University system.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<ul style="list-style-type: none"> <li>- Guest lecturers from partner-universities</li> <li>- International conferences</li> <li>- Development of language training;</li> <li>- ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.</li> </ul>

## Monitoring of PhD Programme “Air navigation and operation of aviation and rocket and space vehicles“

Project EXTEND 586060	BMSTU (P5)
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## Analysis of PhD and teacher training programmes

Programme name (profile and area of study of educational programme)	
25.06.01 Air navigation and operation of aviation and rocket and space vehicles	
The total number of full-time students (statistics over 3 years)	20
The total number of part-time students (statistics over 3 years)	-
How many students are enrolled annually?	5-6
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>Block 1 "Disciplines (modules)", which includes disciplines (modules) related to the basic part of the programme and discipline (modules) related to variable part. This block work load is 30 ECTS, with 9 assigned to basic part                      History and philosophy of science – 4 ECTS                      Foreign Language – 5 ECTS                      and 21 – to variable part.                      Organizational and methodological support of the preparation and defence of a thesis – 1 ECTS                      Fundamentals of pedagogy and psychology of higher education 6 ECTS                      Communicative and stylistic features of oral and written scientific speech – 1 ECTS                      Management and innovation infrastructure – 3 ECTS                      The optional discipline and elective courses in accordance with the scientific specialty, which is included in this area – 10 ECTS                      Block 2 "Internship", which fully refers to the variable part of the programme. This part includes internships to obtain professional skills and experience (including obligatory teaching internship)                      Block 3 "Research", which fully refers to the variable part of the programme. Block 3 and Block 2 work load is 201 ECTS. Block 3 includes research activities and preparation of scientific qualification work (dissertation) for the degree of Candidate of Sciences.                      Block 3 and block 3 workload is 201 ECTS.                      Block 4 "State final attestation", which fully refers to the basic part of the programme (workload is 9 ECTS) and ends with the award of the qualification "Researcher.</p>
If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.	<p>Readiness for teaching on the educational programmes of higher education (GPC-7)                      Know: legal and regulatory framework of teaching in higher education                      To be ABLE to: select and implement effective teaching tools                      Possess skills in technology of design of education process in higher education</p>
How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes	No data

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## Analysis of PhD and teacher training programmes

<p>connected to teaching activities are being assessed?</p>	
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Fundamentals of pedagogy and psychology of higher education 6 ECTS Pedagogical Practice (18 ECTS)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>A1 Overview and experience of the use of modern educational technologies in higher education; modernization of traditional types of training A2 Active educational technology; project-based learning A3 E-learning; new organizational and technological formats of educational activities B2 Self-Improvement of the person as one of the bases of achievement of tops of creative potential; pedagogical experience as result and a support of self-realization of creative potential of the teacher B3 Pedagogical skills – the highest level of professionalism of the teacher; preparation of classroom with the use of techniques of rhetoric and public speaking C1 Modern requirements to the European engineer according to the concept of sustainable development; history of formation and development of technical education in Russia C2 History of foreign engineering education; modern trends in the development of higher technical education in Russia and abroad. C3 Comparative analysis of foreign systems of higher education; subject "Engineering pedagogy", its place and role in the system of pedagogical science C4 Social expectations concerning qualities of graduate of higher technical school; professional requirements to the teacher of higher school. C5 Structure of activity of the teacher of the higher school; theoretical bases of a technique of teaching at the higher school B1 Psychology of higher education; components of professionalism and behavior and activities (group dynamics, group norms) C6 Requirements for modern educational technologies in relation to the motivation of the educational situation; organizational forms and content of training at the University C7 Modular system of training, design goals and content of the curriculum; practical use of the properties of the material for the preparation of training sessions and presentations C8 Methods of preparation and control measures, methods of evaluation of the teacher, professional culture of the engineer</p>

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## Analysis of PhD and teacher training programmes

	<p>C9 the Culture of high school teacher as a necessary component of educational process</p> <p>D1 Dynamics of mental development (childhood, adolescence and youth)</p> <p>D2 Dynamics of mental development (adult psychology, old age); the role of the group in human behavior and activity (group structure, group processes)</p> <p>D3 Role of the group in human creative self-realization of the person</p> <p>D4 Role of the group in human behavior and activity (structure of psychological climate in the group); conscious communication in conflict situations (conflicts in different spheres of human interaction)</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Each students' group has a tutor, who is in charge of conducting teaching internship. BMSTU has a special department that organizes and controls this kind of activity. The teaching internship includes the following steps:</p> <ul style="list-style-type: none"> <li>- getting an individual task;</li> <li>- introductory briefing;</li> <li>- analysis of individual tasks;</li> <li>- study of new materials, methods, technologies;</li> <li>- conducting classes, developing training systems or writing teaching materials;</li> </ul> <p>preparation of the report on practice</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures)?</p>	<p>There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises. Scientific research undertaken by PhD students is being used by industry actors. Industry representatives are conducting guest lectures at BMSTU.</p>
<p>What ICT tools are being used in the programme?</p>	<ul style="list-style-type: none"> <li>• Microsoft Office 2007 Suites (Communicator, Enterprise)</li> <li>• Microsoft Office Professional Plus 2010 (x86, x64)</li> <li>• Microsoft Project Professional 2010</li> <li>• Microsoft Visio Premium 2010 (x86, x64)</li> <li>• Microsoft Visio Professional 2013(x86, x64)</li> <li>• Microsoft Windows 7 (Enterprise x86, Enterprise x64, Professional x86, Professional x64)</li> <li>• Microsoft Windows 8 Professional (x86, x64)</li> <li>• Microsoft Windows 8.1 Professional (x86, x64)</li> <li>• Microsoft Windows Vista Business (x86)</li> <li>• Microsoft Windows XP Professional (x86, x64)</li> <li>• Microsoft Office Professional 2013 (x86, x64)</li> <li>• Microsoft Visual Studio 2012, 2013</li> <li>• Kaspersky antivirus</li> </ul>

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## Analysis of PhD and teacher training programmes

	<ul style="list-style-type: none"> <li>• Antivirus DrWeb97</li> <li>• Microsoft SQL Server Standard Edition 2005</li> <li>• Microsoft SQL Server 2012 Standard Edition</li> <li>• Microsoft SQL Server 2005 Enterprise Edition</li> <li>• Microsoft SQL Server 2005 Developer Edition</li> <li>• Microsoft Server Std 2003 R2 SP2</li> <li>• Microsoft Server 2008 R2</li> <li>• Microsoft Server 2003 Enterprise R2</li> <li>• Microsoft ISA Server Std 2006</li> <li>• Microsoft Exchange Server Std 2007</li> <li>• ABBY FineReader 8.0, 9.0, 10.0 Corporate Edition</li> <li>• ABBY Lingvo 12, X3</li> <li>• Catia</li> <li>• Autodesk AutoCAD2010</li> <li>• Autodesk Inventor 2010</li> <li>• Mathcad 14</li> <li>• Mathworks R2012</li> <li>• ProEngineer</li> <li>• Siemens NX, NXNastran</li> <li>• SmarTeam</li> <li>• SolidWorks</li> </ul> <p>Electronic library of BMSTU "Yauza" provides graduate students with access to internal and external information resources. The electronic catalogue, as an integral part of the electronic library, provides the implementation of reference and bibliographic and information services for graduate students. The electronic catalog contains more than 925 thousand records. Bibliographic records and full-text materials are available in the electronic catalogue.</p> <p>Actively used by graduate students access to external information resources in on-line mode: SPIE (Society of Photo-Optical instruments, Inc) Digital Library (magazines, conferences), Oxford University Press (magazines), American Institute of Physics (magazines), Sage Publications (magazines), Taylor &amp; Francis (magazines), Optical Society of America (magazines, conferences), scientometric abstract base SCOPUS, full-text-vye database publishing Springer, IEEE/IET library, Wiley.</p> <p>In the reading rooms of the library are freely accessible all of the latest issue of the national periodical publications received in the library - 462 title.</p> <p>Domestic electronic resources are represented by the following publications: full texts of all existing state Standards (VNIKI), Database "Science and technology in Russia", scientific electronic library - elibrary.ru, abs "LAN".</p>
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## Analysis of PhD and teacher training programmes

	<p>In addition, graduate students of BMSTU have the opportunity to work with the following scientific electronic resources in the test mode: database of Economics and law polpred.com. ProQuest (dissertations, journals, books).</p> <p>BMSTU has access to the following specialized WEB-services: Ebsco Discovery Services, including a catalog and a search engine for all available information resources, including the catalog of the scientific and technical library of BMSTU.</p> <p>Ninety-eight A-to-Z and LinkSource from EBSCO (EBSCO, USA) is a specialized library web service that includes an electronic catalog of foreign scientific periodicals and allows you to follow the links in the search results to the full text of articles available from the IP-addresses of the University.</p> <p>The system of remote user authentication takes place through a single authentication center BMSTU Webvpn. Through this center is available in the all panotec-Stevie resources of the publishing house BMSTU and electronic University system.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<ul style="list-style-type: none"> <li>- Guest lecturers from partner-universities</li> <li>- International conferences</li> <li>- Development of language training;</li> <li>- ensuring mobility and involvement in the international educational process in accordance with the requirements of the Bologna process.</li> </ul>

## Monitoring of Teachers' training Programme "Topical questions of professional activity of the researcher and teacher at BMSTU"

Project EXTEND 586060	Bauman Moscow State Technical University
<p>Programme name and it's duration in hours/credits</p> <p>Topical questions of professional activity of the researcher and teacher at BMSTU</p>	
The total number of learners completed programme (statistics over 3 years)	687
How many teachers are enrolled annually?	200-230
<p>Structure of the teacher training programme (list of topics/themes with credits)</p>	
List of topics/themes activities with credit hours	<p>The contents of the course is divided in two blocks. "Basic (compulsory)" part (16 academic hours) include the following modules:</p> <ul style="list-style-type: none"> <li>• The legal basis of the daily activities of the teacher. Anti-corruption in education.</li> <li>• Prevention of extremism and terrorism penetration into the educational environment</li> <li>• Formation of electronic information and educational environment (IOS).</li> <li>• Local regulations of educational activities of the University</li> <li>• Writing an article in a peer-reviewed journal.</li> </ul>

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## Analysis of PhD and teacher training programmes

	<ul style="list-style-type: none"> <li>• First aid.</li> <li>• Designing educational literature in the MSTU. N. Uh. Bauman</li> <li>• Documentary support of the implementation of the main educational programmes of the University</li> </ul> <p>Second part is variable and open for teachers to choose relevant topics (20 academic hours). Teacher can take several modules out of the variable part. It includes the following modules:</p> <ul style="list-style-type: none"> <li>• Organization of medical services at the University</li> <li>• Legal basis of daily activities of the teacher</li> <li>• Issues of patent protection of intellectual property</li> <li>• Training to improve the skills of public speaking teacher.</li> </ul> <p>Presentation secrets</p> <ul style="list-style-type: none"> <li>• Training on business etiquette. The image of a teacher</li> <li>• Information security</li> <li>• The theory of inventive problem solving (TRIZ)</li> <li>• Work with the electronic library of the University and third-party libraries. Publication activity</li> <li>• Modern requirements of publishers to writing abstracts for scientific articles in English</li> <li>• Modern technologies and equipment for 3D modeling and rapid prototyping to improve the visibility of the educational process</li> <li>• Development of the ability to learn. Psychology of educational activity</li> <li>• Practical work with e-University - Current academic performance</li> <li>• Practical work with "Electronic University" - Library of academic disciplines, Curricula</li> <li>• Organizational and methodological support of postgraduate training at the University</li> <li>• The use of technical means of training (TCO) during interactive sessions</li> <li>• Basic computer training (Windows, Office)</li> <li>• Work in WORD and EXCEL for intermediate users</li> <li>• Experience of working in MATLAB</li> <li>• Working with INVENTOR (Basic and advanced courses)</li> <li>• Basics of working in SOLID WORKS</li> <li>• Basics of working in the EULER software package</li> <li>• Creating illustrations (Adobe Photoshop, Illustrator)</li> <li>• Theory of artificial neural networks</li> <li>• The concept of modern natural science</li> <li>• Optimization method</li> <li>• Psychological aspects of engineering activity</li> <li>• Communication theory (in English or French).)</li> </ul>
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## Analysis of PhD and teacher training programmes

	<ul style="list-style-type: none"> <li>• Psychology of higher education (practical classes)</li> <li>• Comparative analysis of CAD packages (12 hours)</li> <li>• Basics of working in the EULER software package</li> <li>• Design of equipment with the help of arm WinMachine</li> <li>• Works with AUTOCAD (Basic and advanced courses)</li> <li>• Experience of working in SIEMENS NX</li> </ul>
<p>Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio</p>	<p>The contents of the course is divided in two blocks. “Basic (compulsory)” part consist of 16 academic hours of lectures. No independent work.</p> <p>Second part is variable and open for teachers to choose relevant topics. 20 academic hours of lectures, no independent work. Teacher can take several modules out of the variable part.</p>
<p>List of learning outcomes in the programme.</p>	<p>Professional competence 1</p> <p>Ability to apply modern methods and technologies of organization of educational activities, diagnostics and evaluation of the quality of the educational process in different educational programmes</p> <p>Learning outcomes:</p> <p>Know: Features of the organization of the educational process for undergraduate programmes, specialty, master's and additional programmes.</p> <p>Taught area of scientific (scientific and technical) knowledge and (or) professional figure-news.</p> <p>Modern educational technologies of professional education.</p> <p>The basics of the legislation of the Russian Federation on education and local regulations governing the organization of the educational process, the intermediate and final (final state) certification of students on bachelor programmes, specialty, master's and (or) additional education, procedure for access to educational and other documentation, including documentation containing personal data.</p> <p>Responsibility for the life and health of students under the guidance of a teacher.</p> <p>Possess skills</p> <p>Perform activities and (or) to demonstrate the elements of activity, mastered by students, and (or) perform tasks, provided by the programme of the training course, discipline (module). To use pedagogically reasonable forms, methods and techniques of organization of students ' activity, to use modern technical means of education and educational technologies, including, if necessary, to carry out e-learning, to use remote educational technologies, information and communication technologies, electronic educational and information resources, taking into account the:</p> <ul style="list-style-type: none"> <li>- the specifics of the programmes of bachelor, specialist, master's and additional education requirements of the new standard;</li> <li>- features of the taught training course, discipline (module);</li> <li>- the objectives of the lesson (series of lessons).</li> </ul>

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	<p>To set pedagogically relevant relationships with students.</p> <p>To create a problem-oriented educational environment in the classroom, ensuring the formation of students ' competencies, according to educational standards, established by the educational organization, and (or) educational programme.</p> <p>Make adjustments to the work programme, the plan of study of the course, discipline (module), educational technology, their own professional activities on the basis of the analysis of the educational process and its results</p> <p>Professional competence 4 Readiness to develop and implement methods, technologies and techniques of training, to analyze the results of the process of their use in organizations engaged in educational activities.</p> <p>Learning outcomes</p> <p>Possess skills to develop scientific and methodological support of training courses, disciplines (modules) undergraduate programmes, specialty, master's and (or) additional education; create scientific and methodological, educational and training texts, taking into account the requirements of scientific and journalistic style; conduct training and planning documentation on paper and electronic carriers,</p> <p>Know Methodological foundations of modern education, the Legislation of the Russian Federation on education, local regulations of educational organizations, the requirements of the education standards, requirements of professional standards and other qualification characteristics, the requirements for scientific and methodological support of educational courses, subjects (modules) programmes and (or) the additional education; the procedure for the development and use of approximate or typical educational programmes; the main sources and methods of information search necessary for the development of scientific and methodological support for the implementation of training courses, disciplines (modules) programmes</p>
<p>How do you measure learning outcomes? List and give short description of how learning outcomes are being assessed, including final assessment.</p>	<p>Oral exam based on interview</p>
<p>Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?</p>	<p>Mostly used lectures. The usage of active methods is very low.</p>
<p>How many teachers deliver the course and what is their expertise.</p>	<p>The specialists of the relevant departments: Educational and methodical management, Center of modern educational technologies, Center of educational standards and programmes, Center of educational process.</p>

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Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	Computer, multimedia projector, screen, whiteboard, marker, Microsoft Office, ATP Consultant, Internet, access to electronic university system.
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	Certificate of professional development. It has practical value, because it allows to perform methodical work at the proper level. These courses are a prerequisite for the implementation of the annual effective contract with the teacher
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?	Some of the modules of the course are based on materials and equipment of university industry partners such as Siemens. Sometimes guest lectures from industry partners are involved in the course.
What ICT tools are being used in the programme?	Computer, multimedia projector, screen, whiteboard, marker, Microsoft Office, ATP Consultant, Internet, access to electronic university system.
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	No

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### Appendix 3 – Outcome 1.1 NRMSU, Saransk, Russia

In this Appendix it is possible to find the whole set of Outcomes 1.1. done by National Research Mordovia State University, Saransk, Russian Federation. The monitoring of University's practices in PhD students' and teacher's training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

#### Monitoring of PhD student's training Programme "Electrical and Heating Technology", direction "Lighting"

Project EXTEND 586060	National Research Mordovia State University	
Programme name (profile and area of study of educational programme) ELECTRICAL AND HEATING TECHNOLOGY Direction "Lighting"		
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)	
The total number of full-time students (statistics over 3 years)	16	
The total number of part-time students (statistics over 3 years)	0	
How many students are enrolled annually?	3	
Structure of the PhD programme (list of courses, internships and research with credits)		
List of courses, internships and research activities with credit hours	<p>The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 240 credits.</p> <p>The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable).</p> <p>Block 1 "Disciplines" is 30 credits, including:</p> <p>a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits:</p> <p>a1) Foreign language - 5 credits, including independent work - 2.5 credits;</p> <p>a2) History and philosophy of science - 4 credits, including independent work - 2 credits</p> <p>b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching.</p> <p>B1) Mandatory disciplines - 16 credits</p> <ul style="list-style-type: none"> <li>- Light engineering - 7 credits, including independent work - 3.6 credits;</li> <li>- Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit;</li> <li>- Information technology in science and education - 2 credits, including independent work - 1 credit;</li> <li>- Higher education pedagogy - 2 credits, including independent work - 1 credit;</li> <li>- Business project management - 3 credits, including independent work - 1.5 credits;</li> </ul> <p>B2) Optional courses - 5 credits:</p>	

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	<p>- LED light sources and lighting devices based on them - 5 credits, including independent work - 2.75 credits;</p> <p>or</p> <p>- Photometry of LEDs and light devices based on them - 5 credits, including independent work - 2.75 credits;</p> <p>Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:</p> <p>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits;</p> <p>b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</p> <p>Block 3 "Scientific Research" fully relates to the variable part of the programme, amounts to 195 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Science</p> <p>Unit 4 "State final certification" in full refers to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p> <p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification "Researcher. Teacher Research."</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>The types of professional activity of graduates, among other things, include teaching activities in educational programmes of HE in the field of electrical and heating engineering (lighting engineering).</p> <p>The tasks of the graduate's professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>The graduate's readiness for teaching, as well as his ability to develop the scientific and methodological support of educational disciplines in the field of electrical and heating technology (lighting engineering) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification "Researcher. Teacher Research."</p>

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<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>The graduate's readiness for teaching, as well as his ability to develop the scientific and methodological support of educational disciplines in the field of electrical and heat engineering (lighting engineering) is assessed:</p> <p>1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students' knowledge of higher school pedagogy, teaching features, developing postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and for mastering general professional competence of a higher school teacher.</p> <p>2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice; The practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload.</p> <p>2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labour input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students' knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel.</p> <p>2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; the application of knowledge about modern</p>

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	<p>research methods in their practical activities, as well as the provision of a system of methodological principles and approaches to scientific research in the field of electrical and heating equipment to a graduate student and applicant.</p> <p>3) "Information technology in science and education" - The purpose of the discipline is to develop the knowledge of information technology used in lighting engineering by graduate students on subject-oriented information management learning systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of electrical and heating equipment.</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students' knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of the continuous independent work of students when studying at a higher educational institution and after graduation; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the GEF VO (the level of training of highly qualified personnel; the staff (social group));</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities: a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences; e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students,</p>

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	<p>management of student research, management of students' practical training under the supervision of a supervisor.</p> <p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities: - database and information technology on the profile of the activity; methodologies for the development of teaching aids, outlines of lecture courses and practical exercises in the disciplines of higher education; recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</p> <p>As a result of pedagogical practice, based on the content of the task, determined by the supervisor, the graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline, etc.</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the basis of the verification of the written report and its consideration at the meeting of the department in the form of test.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>During the entire training period, students have the opportunity to:</p> <ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are been provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University.</p> <p>Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znanium.com/">http://znanium.com/</a>.</li> </ol> <p>The university is been provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is going annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> <li>- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.</li> </ul>



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### Monitoring of PhD student's training Programme "Electrical and Heating Technology", profile "Power stations and electric power systems"

Project EXTEND 586060	National Research Mordovia State University
Programme name (profile and area of study of educational programme) ELECTRICAL AND HEATING TECHNOLOGY Profile "Power stations and electric power systems"	
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)
The total number of full-time students (statistics over 3 years)	2
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1-2
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 240 credits. The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable). Block 1 "Disciplines" is 30 credits, including: a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits: a1) Foreign language - 5 credits, including independent work - 2.5 credits; a2) History and philosophy of science - 4 credits, including independent work - 2 credits b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching. B1) Mandatory disciplines - 16 credits - Electric power stations and electric power systems - 7 credits, including independent work - 3.6 credits; - Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit; - Information technology in science and education - 2 credits, including independent work - 1 credit; - Higher education pedagogy - 2 credits, including independent work - 1 credit; - Business project management - 3 credits, including independent work - 1.5 credits; B1) Optional courses - 5 credits: - Modeling of electric power systems - 5 credits, including independent work - 2.75 credits; or - Optimization of electric power system modes - 5 credits, including independent work - 2.75 credits; Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:

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	<p>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits;</p> <p>b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</p> <p>Block 3 “Scientific Research” fully relates to the variable part of the programme, amounts to 195 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Science</p> <p>Unit 4 “State final certification” fully relates to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p> <p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification “Researcher. Teacher Research”</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>Among other things, the types of professional activity of graduates include teaching activities in educational programmes of higher education in the field of electrical and heat engineering (power plants and electrical power systems).</p> <p>The tasks of the graduate’s professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for educational disciplines in the field of electrical and heat engineering (power plants and electrical power systems) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification “Researcher. Teacher Research.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes</p>	<p>The graduate's readiness for teaching activities, as well as his ability to develop scientific and methodological support of educational disciplines in the field of electrical and heat engineering (power plants and electrical power systems), is assessed:</p> <ol style="list-style-type: none"> <li>1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students'</li> </ol>

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<p>connected to teaching activities to be being assessed?</p>	<p>knowledge of higher school pedagogy, teaching features, developing postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and for mastering general professional competence of a higher school teacher.</p> <p>2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice; The practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload.</p> <p>2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labor input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel.</p> <p>2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; the application of knowledge about modern research methods in their practical activities, as well as the provision to the graduate student and the applicant of a system of methodological principles and approaches to scientific research in the field of electrical and heating equipment (power plants and electrical power systems).</p>

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	<p>3) "Information technology in science and education" - The purpose of the discipline is to develop the knowledge of the information technology used in electrical and heat engineering (power plants and electrical power systems) in graduate students; on subject-oriented information management learning systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of electrical and heating equipment (power plants and electrical power systems) ..</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students' knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of continuous independent work of students when studying at a university or after it; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the higher education standards (the level of training of highly qualified personnel; the team (social group) of the scientific and pedagogical employees of departments, faculties, universities; student teams (social groups).</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities: a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences; e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students, management of student research, management of students' practical training under the supervision of a supervisor.</p>

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	<p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities: - database and information technology on the profile of the activity; methodologies for the development of teaching aids, outlines of lecture courses and practical exercises in the disciplines of higher education; recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</p> <p>As a result of the pedagogical practice, based on the content of the task, determined by the supervisor, a graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the results of the verification of the written report and its consideration at the meeting of the department in the form of test.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>During the entire training period, students have the opportunity to:</p> <ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University.</p> <p>Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znanium.com/">http://znanium.com/</a>.</li> </ol> <p>The university is provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is carried out annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> <li>- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.</li> </ul>

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**Analysis of PhD and teacher training programmes**
**Monitoring of PhD student's training Programme "Electrical and Heating Technology", profile "Electrotechnical Complexes and Systems"**

Project EXTEND 586060		National Research Mordovia State University	
Programme name (profile and area of study of educational programme) ELECTRICAL AND HEATING TECHNOLOGY Profile "Electrotechnical Complexes and Systems"			
The total number of full-time students (statistics over 3 years)		The total number of part-time students (statistics over 3 years)	
The total number of full-time students (statistics over 3 years)		6	
The total number of part-time students (statistics over 3 years)		0	
How many students are enrolled annually?		2	
Structure of the PhD programme (list of courses, internships and research with credits)			
List of courses, internships and research activities with credit hours		The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 240 credits. The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable). Block 1 "Disciplines" is 30 credits, including: a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits: a1) Foreign language - 5 credits, including independent work - 2.5 credits; a2) History and philosophy of science - 4 credits, including independent work - 2 credits b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching. B1) Mandatory disciplines - 16 credits - Electrical systems and systems - 7 credits, including independent work - 3.6 credits; - Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit; - Information technology in science and education - 2 credits, including independent work - 1 credit; - Higher education pedagogy - 2 credits, including independent work - 1 credit; - Business project management - 3 credits, including independent work - 1.5 credits; B1) Optional courses - 5 credits: - Control systems of electric drives - 5 credits, including independent work - 2.75 credits; or - Simulation of electrical systems - 5 credits, including independent work - 2.75 credits; Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:	

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	<p>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits;</p> <p>b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</p> <p>Block 3 “Scientific Research” fully relates to the variable part of the programme, amounts to 195 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Science</p> <p>Unit 4 “State final certification” fully relates to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p> <p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification “Researcher. Teacher Research.</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>The types of professional activity of graduates, among other things, include teaching activities in educational programmes of HE in the field of electrical and heating engineering (electrical engineering systems and systems).</p> <p>The tasks of the graduate’s professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>A graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of electrical and heat engineering (electrical systems and systems) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification “Researcher. Teacher Research.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>The graduate's readiness for teaching, as well as his ability to develop the scientific and methodological support of educational disciplines in the field of electrical and heat engineering (electrical systems and systems) is assessed:</p> <ol style="list-style-type: none"> <li>1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students' knowledge of higher school pedagogy, teaching features, developing postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the</li> </ol>

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## Analysis of PhD and teacher training programmes

	<p>research and practical field and for mastering general professional competence of a higher school teacher.</p> <p>2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice;</p> <p>The practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload.</p> <p>2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labour input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel.</p> <p>2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; the application of knowledge about modern research methods in their practical activities, as well as the provision to the graduate student and the applicant of a system of methodological principles and approaches to scientific research in the field of electrical and heating equipment (electrical systems and systems).</p> <p>3) "Information technologies in science and education" - the purpose of the discipline is to develop the knowledge of information technologies used in electrical and heating engineering (electrical engineering complexes and systems) by graduate students; on subject-oriented information</p>



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	<p>management learning systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of electrical and heating equipment (electrical systems and systems).</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students' knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of continuous independent work of students when studying at a university or after it; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the higher education standards (the level of training of highly qualified personnel; the team (social group) of the scientific and pedagogical employees of departments, faculties, universities; student teams (social groups).</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities: a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences; e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students, management of student research, management of students' practical training under the supervision of a supervisor.</p> <p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities: - database and information technology on the profile of the activity; methodologies for the development of teaching aids, outlines of lecture</p>

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	<p>courses and practical exercises in the disciplines of higher education; recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</p> <p>As a result of the pedagogical practice, based on the content of the task, determined by the supervisor, a graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the results of the verification of the written report and its consideration at the meeting of the department in the form of test</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>During the entire training period, students have the opportunity to:</p> <ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University.</p> <p>Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znanium.com/">http://znanium.com/</a>.</li> </ol> <p>The university is provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is carried out annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> <li>- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.</li> </ul>

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## Analysis of PhD and teacher training programmes

### Monitoring of PhD student's training Programme "Technologies, Mechanization tools and Energy Equipment in Agriculture, Forestry and Fish Equipment", profile "Technologies and means of agricultural mechanization"

Project EXTEND 586060	National Research Mordovia State University	
Programme name (profile and area of study of educational programme) TECHNOLOGIES, MECHANIZATION TOOLS AND ENERGY EQUIPMENT IN AGRICULTURE, FORESTRY AND FISH EQUIPMENT Profile "Technologies and means of agricultural mechanization"		
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)	
The total number of full-time students (statistics over 3 years)	21	
The total number of part-time students (statistics over 3 years)	0	
How many students are enrolled annually?	6	
Structure of the PhD programme (list of courses, internships and research with credits)		
List of courses, internships and research activities with credit hours	The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 180 credits. The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable). Block 1 "Disciplines" is 30 credits, including: a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits: a1) Foreign language - 5 credits, including independent work - 2.5 credits; a2) History and philosophy of science - 4 credits, including independent work - 2 credits b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching. B1) Mandatory disciplines - 16 credits - Technologies and means of agricultural mechanization - 7 credits, including independent work - 3.6 credits; - Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit; - Information technology in science and education - 2 credits, including independent work - 1 credit; - Higher education pedagogy - 2 credits, including independent work - 1 credit; - Business project management - 3 credits, including independent work - 1.5 credits; B1) Optional courses - 5 credits: - Testing of mobile energy and agricultural machinery - 5 credits, including independent work - 2.75 credits; or	

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	<p>- Testing of stationary technological machines and equipment in agriculture - 5 credits, including independent work - 2.75 credits; Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:</p> <p>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits; b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</p> <p>Block 3 "Scientific Research" fully relates to the variable part of the programme, amounts to 135 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Sciences</p> <p>Unit 4 "State final certification" fully relates to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p> <p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification "Researcher. Teacher Research.</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>Among other things, the types of professional activity of graduates include teaching activities in educational programmes of higher education in the field of technology, mechanization, energy in agriculture, fisheries and forestry (technology and means of mechanization in agriculture).</p> <p>The tasks of the graduate's professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of technology, mechanization, energy in agriculture, fisheries and forestry (technologies and means of mechanization in agriculture) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification "Researcher. Teacher Research.</p>
<p>How do you measure readiness of PhD students/PhD graduates</p>	<p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of</p>

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## Analysis of PhD and teacher training programmes

<p>to work as an university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>technology, mechanization, energy in agriculture, fisheries and forestry (technology and means of mechanization in agriculture) is assessed: 1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students' knowledge of higher school pedagogy, teaching features, developing postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and for mastering general professional competence of a higher school teacher. 2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice; The practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload. 2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload. 3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload. 4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload. 5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labor input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel. 2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; application of knowledge about modern research methods in their practical activities, as well as providing the graduate</p>

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	<p>student and applicant with a system of methodological principles and approaches to scientific research in the field of technology, mechanization, energy in agriculture, fisheries and forestry (technology and means of mechanization in agriculture)</p> <p>3) "Information technology in science and education" - The purpose of the discipline is to develop the knowledge of information technology used in technology, mechanization, energy in agriculture, fisheries and forestry (technologies and means of mechanization in agriculture) among graduate students; on subject-oriented information management learning systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of technology, mechanization, energy in agriculture, fisheries and forestry (technologies and means of mechanization in agriculture).</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students' knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of continuous independent work of students when studying at a university or after it; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the higher education standards (the level of training of highly qualified personnel; the team (social group) of the scientific and pedagogical employees of departments, faculties, universities; student teams (social groups).</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities: a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences;</p>

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	<p>e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students, management of student research, management of students' practical training under the supervision of a supervisor.</p> <p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities: - database and information technology on the profile of the activity; methodologies for the development of teaching aids, outlines of lecture courses and practical exercises in the disciplines of higher education; recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</p> <p>As a result of the pedagogical practice, based on the content of the task, determined by the supervisor, a graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the results of the verification of the written report and its consideration at the meeting of the department in the form of test</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>During the entire training period, students have the opportunity to:</p> <ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University.</p> <p>Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znanium.com/">http://znanium.com/</a>.</li> </ol> <p>The university is provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is carried out annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> </ul>

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## Analysis of PhD and teacher training programmes

	- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.
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### Monitoring of PhD student's training Programme "Technology and Technology of Construction", profile "Building structures, buildings and facilities"

Project EXTEND 586060	National Research Mordovia State University	
Programme name (profile and area of study of educational programme) TECHNOLOGY AND TECHNOLOGY OF CONSTRUCTION Profile "Building structures, buildings and facilities"		
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)	
The total number of full-time students (statistics over 3 years)	10	
The total number of part-time students (statistics over 3 years)	0	
How many students are enrolled annually?	2-3	
Structure of the PhD programme (list of courses, internships and research with credits)		
List of courses, internships and research activities with credit hours	The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 240 credits. The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable). Block 1 "Disciplines" is 30 credits, including: a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits: a1) Foreign language - 5 credits, including independent work - 2.5 credits; a2) History and philosophy of science - 4 credits, including independent work - 2 credits b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching. B1) Mandatory disciplines - 16 credits - Building structures, buildings and structures - 7 credits, including independent work - 3.6 credits; - Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit; - Information technology in science and education - 2 credits, including independent work - 1 credit; - Higher education pedagogy - 2 credits, including independent work - 1 credit; - Business project management - 3 credits, including independent work - 1.5 credits; B1) Optional courses - 5 credits: - Mathematical methods for planning extreme experiments - 5 credits, including independent work - 2.75 credits; or - The theory of degradation of building materials and structures - 5 credits, including independent work - 2.75 credits;	



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	<p>Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:</p> <ul style="list-style-type: none"> <li>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits;</li> <li>b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</li> </ul> <p>Block 3 "Scientific Research" fully relates to the variable part of the programme, amounts to 195 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Science</p> <p>Unit 4 "State final certification" fully relates to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p> <p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification "Researcher. Teacher Research.</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>Among other things, the types of professional activity of graduates include teaching activities in educational programmes of higher education in the field of technical sciences and architecture (building structures, buildings and structures).</p> <p>The tasks of the graduate's professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of engineering and construction technology (building structures, buildings and structures) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification "Researcher. Teacher Research.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to</p>	<p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of engineering and construction technology (building structures, buildings and structures), is assessed:</p>

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<p>teaching activities to be being assessed?</p>	<p>1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students' knowledge of higher school pedagogy, teaching features, developing postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and for mastering general professional competence of a higher school teacher.</p> <p>2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice; The practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload.</p> <p>2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labor input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel.</p> <p>2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; application of knowledge about modern research methods in their practical activities, as well as the provision of a system of methodological principles and approaches to scientific research in the field of construction to a graduate student and applicant.</p>

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	<p>3) "Information technologies in science and education" - The purpose of the discipline is to develop the knowledge of information technology used by graduate students in subject-oriented information management learning systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of building sciences.</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students' knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of continuous independent work of students when studying at a university or after it; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the higher education standards (the level of training of highly qualified personnel; the team (social group) of the scientific and pedagogical employees of departments, faculties, universities; student teams (social groups).</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities:</p> <p>a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences; e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students, management of student research, management of students' practical training under the supervision of a supervisor.</p> <p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities:</p> <ul style="list-style-type: none"> <li>- database and information technology on the profile of the activity;</li> </ul>

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	<p>methodologies for the development of teaching aids, outlines of lecture courses and practical exercises in the disciplines of higher education; recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</p> <p>As a result of the pedagogical practice, based on the content of the task, determined by the supervisor, a graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the results of the verification of the written report and its consideration at the meeting of the department in the form of test</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>During the entire training period, students have the opportunity to:</p> <ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University.</p> <p>Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znanium.com/">http://znanium.com/</a>.</li> </ol> <p>The university is provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is carried out annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> <li>- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.</li> </ul>

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### Monitoring of PhD students' teaching Programme "Technology and Technology of Construction", profile " Heat supply, ventilation, air conditioning, gas supply and lighting"

Project EXTEND 586060	National Research Mordovia State University
Programme name (profile and area of study of educational programme) TECHNOLOGY AND TECHNOLOGY OF CONSTRUCTION Profile "Heat supply, ventilation, air conditioning, gas supply and lighting"	
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)
The total number of full-time students (statistics over 3 years)	12
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	3
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 240 credits.</p> <p>The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable).</p> <p>Block 1 "Disciplines" is 30 credits, including:</p> <p>a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits:</p> <p>a1) Foreign language - 5 credits, including independent work - 2.5 credits;</p> <p>a2) History and philosophy of science - 4 credits, including independent work - 2 credits</p> <p>b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching.</p> <p>B1) Mandatory disciplines - 16 credits</p> <ul style="list-style-type: none"> <li>- Heat supply, ventilation, air conditioning, gas supply and lighting - 7 credits, including independent work - 3.6 credits;</li> <li>- Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit;</li> <li>- Information technology in science and education - 2 credits, including independent work - 1 credit;</li> <li>- Higher education pedagogy - 2 credits, including independent work - 1 credit;</li> <li>- Business project management - 3 credits, including independent work - 1.5 credits;</li> </ul> <p>B1) Optional courses - 5 credits:</p> <ul style="list-style-type: none"> <li>- Forecasting processes in heating systems - 5 credits, including independent work - 2.75 credits; or</li> <li>- Autonomous sources of heat supply - 5 credits, including independent work - 2.75 credits;</li> </ul> <p>Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:</p>

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	<p>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits;</p> <p>b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</p> <p>Block 3 "Scientific Research" fully relates to the variable part of the programme, amounts to 195 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Science</p> <p>Unit 4 "State final certification" fully relates to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p> <p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification "Researcher. Teacher Research."</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>Among other things, the types of professional activity of graduates include teaching activities on educational programmes of higher education in the field of technical sciences and architecture (heat supply, ventilation, air conditioning, gas supply and lighting).</p> <p>The tasks of the graduate's professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of engineering and construction technology (heat supply, ventilation, air conditioning, gas supply and lighting) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification "Researcher. Teacher Research."</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of engineering and construction technology (heat supply, ventilation, air conditioning, gas supply and lighting), is assessed:</p> <ol style="list-style-type: none"> <li>1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students' knowledge of higher school pedagogy, teaching features, developing</li> </ol>

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	<p>postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and for mastering general professional competence of a higher school teacher.</p> <p>2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice; The practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload.</p> <p>2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labor input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel.</p> <p>2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; application of knowledge about modern research methods in their practical activities, as well as the provision of a system of methodological principles and approaches to scientific research in the field of construction to a graduate student and applicant.</p> <p>3) "Information technologies in science and education" - The purpose of the discipline is to develop the knowledge of information technology used by graduate students in subject-oriented information management learning</p>

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	<p>systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of building sciences.</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students' knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of continuous independent work of students when studying at a university or after it; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the higher education standards (the level of training of highly qualified personnel; the team (social group) of the scientific and pedagogical employees of departments, faculties, universities; student teams (social groups).</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities:</p> <p>a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences; e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students, management of student research, management of students' practical training under the supervision of a supervisor.</p> <p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities:</p> <ul style="list-style-type: none"> <li>- database and information technology on the profile of the activity;</li> <li>methodologies for the development of teaching aids, outlines of lecture courses and practical exercises in the disciplines of higher education;</li> </ul>



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	<p>recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</p> <p>As a result of the pedagogical practice, based on the content of the task, determined by the supervisor, a graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the results of the verification of the written report and its consideration at the meeting of the department in the form of test</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>During the entire training period, students have the opportunity to:</p> <ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University.</p> <p>Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znaniium.com/">http://znaniium.com/</a>.</li> </ol> <p>The university is provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is carried out annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> <li>- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.</li> </ul>

**Monitoring of PhD students' teaching Programme "Technology and Technology of Construction", profile "Building materials and products "**

Project EXTEND 586060	National Research Mordovia State University
<p>Programme name (profile and area of study of educational programme)</p> <p style="text-align: center;">TECHNOLOGY AND TECHNOLOGY OF CONSTRUCTION</p>	

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Profile "Building materials and products"	
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)
The total number of full-time students (statistics over 3 years)	41
The total number of part-time students (statistics over 3 years)	1
How many students are enrolled annually?	10-11
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>The scope of the postgraduate programme, regardless of the form of study, the implementation of the postgraduate programme for the individual curriculum, including accelerated studies, is 240 credits.</p> <p>The structure of the postgraduate programme includes the obligatory part (basic) and the part formed by the participants of educational relations (variable).</p> <p>Block 1 "Disciplines" is 30 credits, including:</p> <p>a) The basic part - disciplines (modules), aimed at preparing for the delivery of candidate exams - 9 credits:</p> <p>a1) Foreign language - 5 credits, including independent work - 2.5 credits;</p> <p>a2) History and philosophy of science - 4 credits, including independent work - 2 credits</p> <p>b) The variable part - 21 credits. It includes disciplines aimed at preparing for the delivery of the candidate exam, and disciplines aimed at preparing for teaching.</p> <p>B1) Mandatory disciplines - 16 credits</p> <ul style="list-style-type: none"> <li>- Building materials and products - 7 credits, including independent work - 3.6 credits;</li> <li>- Methodology and methodology of scientific research - 2 credits, including independent work - 1 credit;</li> <li>- Information technology in science and education - 2 credits, including independent work - 1 credit;</li> <li>- Higher education pedagogy - 2 credits, including independent work - 1 credit;</li> <li>- Business project management - 3 credits, including independent work - 1.5 credits;</li> </ul> <p>B1) Optional courses - 5 credits:</p> <ul style="list-style-type: none"> <li>- Modern building materials - 5 credits, including independent work - 2.75 credits; or</li> <li>- Nano-modification in the technology of building materials - 5 credits, including independent work - 2.75 credits;</li> </ul> <p>Block 2 of the "Practice" in full refers to the variable part of the programme, is 6 credits and includes:</p> <p>a) Practice in obtaining professional skills and professional experience - teaching practice - 3 credits;</p> <p>b) Practice in obtaining professional skills and professional experience - research practice - 3 credits;</p> <p>Block 3 "Scientific Research" fully relates to the variable part of the programme, amounts to 195 credits and includes research activities and the preparation of scientific and qualification work (thesis) for the degree of Candidate of Science</p> <p>Unit 4 "State final certification" fully relates to the basic part of the programme, is 9 credits, of which 2.5 credits are independent work.</p>

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	<p>Block 4 "State final certification" includes:</p> <ul style="list-style-type: none"> <li>- Preparation for passing and passing the state exam;</li> <li>- Presentation of a scientific report on the main results of the prepared scientific and qualification work (thesis), designed in accordance with the requirements established by the Ministry of Education and Science of the Russian Federation and local acts of the University.</li> </ul> <p>The state final certification ends with the assignment of the qualification "Researcher. Teacher Research".</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>In the field of professional activity of graduate postgraduate students, among other things, it includes conducting educational and methodical work in educational institutions of higher education.</p> <p>Among other things, the types of professional activity of graduates include teaching activities in educational programmes of higher education in the field of technical sciences and architecture.</p> <p>The tasks of the graduate's professional activities include:</p> <ul style="list-style-type: none"> <li>- Teaching courses, disciplines under bachelor degree programmes, specialty and (or) additional professional education;</li> <li>- management of research, project, educational and vocational and other activities of students on undergraduate programmes, specialty and (or) additional vocational training;</li> <li>- development of scientific and methodological support for the implementation of training courses, disciplines of undergraduate programmes, specialties and (or) additional professional training.</li> </ul> <p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of engineering and construction technology (building materials and products) are formed by:</p> <ol style="list-style-type: none"> <li>1) studying the discipline "Higher education pedagogy";</li> <li>2) practical training in obtaining professional skills and professional experience - teaching practice;</li> <li>3) in preparation for passing and passing the state exam</li> </ol> <p>According to the results of the State final certification, the graduate is awarded the qualification "Researcher. Teacher Research."</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>The graduate's readiness for teaching, as well as his ability to develop scientific and methodological support for academic disciplines in the field of engineering and construction technology (building materials and products), is assessed:</p> <ol style="list-style-type: none"> <li>1) according to the results of the development of the discipline "Pedagogy of Higher Education" (test). Discipline is aimed at developing graduate students' knowledge of higher school pedagogy, teaching features, developing postgraduate humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and for mastering general professional competence of a higher school teacher.</li> <li>2) according to the results of the internship in obtaining professional skills and professional experience - teaching practice;</li> </ol> <p>The practice is directed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional</p>

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	<p>education; conducting classroom training for the implementation of the educational process in higher education.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>1) The history and philosophy of science - the basic part of the disciplines, is studied on the 1st year, in the 1st semester. The complexity of the discipline - 4 credits, including independent work - 2 credits; 1.6% of total workload.</p> <p>2) The methodology and methodology of scientific research - the variable part, mandatory disciplines; Studied at the 1st year, in the 2nd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>3) Information technologies in science and education - the variable part, mandatory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>4) Higher education pedagogy - variable part, compulsory disciplines; Studied in the 2nd year, in the 3rd semester. The complexity of the discipline - 2 credits, including independent work - 1 credit; 0.8% of total workload.</p> <p>5) Practice in obtaining professional skills and professional experience - teaching practice is conducted on the 2nd course, in the 4th semester. Labor input - 3 credits; 1.25% of total workload.</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>1) "History and Philosophy of Science" - the goal of mastering the discipline is the formation of graduate students knowledge, general scientific and general professional competencies, as well as the skills of research work in their chosen profile. The programme is focused on the analysis of the main world outlook and methodological problems arising in science at the present stage of its development, and obtaining an idea of the trends of the historical development of science, contributing to the formation of future scientific and pedagogical personnel.</p> <p>2) "Methodology and methodology of scientific research" - The purpose of the discipline is: the study of basic fundamental and applied problems in the field of research methodology and the development of post-graduate students the skills of scientific and theoretical thinking; formation of the ability to apply modern research methods in practical activities; mastering the processing and processing of research results; application of knowledge about modern research methods in their practical activities, as well as the provision of a system of methodological principles and approaches to scientific research in the field of construction to a graduate student and applicant.</p> <p>3) "Information technologies in science and education" - The purpose of the discipline is to develop the knowledge of information technology used by graduate students in subject-oriented information management learning systems; development of modern tools of object-oriented programming and their possible application in the field of solving problems of building sciences.</p> <p>4) "Higher education pedagogy" - Discipline is aimed at developing graduate students 'knowledge of higher education pedagogy, teaching features, developing post-graduate students' humanitarian thinking, increasing psychological and pedagogical knowledge and ways of working for successful work in the research and practical field and mastering the general professional competencies of a higher education teacher.</p> <p>The subject area of the discipline "Higher education pedagogy" includes: higher education institution as a pedagogical system; the functioning and effectiveness of the pedagogical process in higher education; pedagogical</p>

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	<p>activities of scientific and pedagogical workers, pedagogical laws of formation and development of the student's personality; the process of higher education and self-education; higher education; education and self-education of students; forms, methods and pedagogical technologies in higher education institutions; pedagogical aspects of continuous independent work of students when studying at a university or after it; the identity of the scientific and pedagogical worker; pedagogical features of the interaction of students and scientific and pedagogical workers in the pedagogical process of the university during the implementation of the higher education standards (the level of training of highly qualified personnel; the team (social group) of the scientific and pedagogical employees of departments, faculties, universities; student teams (social groups).</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Practice in obtaining professional skills and professional experience - teaching practice is aimed at acquaintance with the principles of the organization of the educational process at the university; study and analysis of scientific and technical information, domestic and foreign experience in the field of activity; the development of teaching aids, fragments of work programmes of laboratory and practical classes in the disciplines of higher professional education; conducting classroom training for the implementation of the educational process in higher education.</p> <p>Pedagogical practice, as a rule, is conducted in the structural units of the university. Way of carrying out - stationary / exit practice.</p> <p>The pedagogical practice of graduate students includes the following activities:</p> <p>a) the development of an individual plan of pedagogical practice; b) familiarity with the organization of the educational process in higher education; c) attendance of scientific and methodological consultations (seminars); d) study of the teaching experience of the leading teachers of the university during attending classes in scientific discipline and related sciences; e) individual planning and development of study content, methodical work on the subject; e) independent conducting of studies on academic discipline (seminars, practical and laboratory studies); g) individual work with students, management of student research, management of students' practical training under the supervision of a supervisor.</p> <p>During the internship period, a graduate student should collect and analyze all the available materials necessary for the implementation of teaching activities:</p> <ul style="list-style-type: none"> <li>- database and information technology on the profile of the activity;</li> <li>methodologies for the development of teaching aids, outlines of lecture courses and practical exercises in the disciplines of higher education;</li> <li>recommendations on the conduct of classroom instruction, management of course and diploma projects, training and production practices.</li> </ul> <p>As a result of the pedagogical practice, based on the content of the task, determined by the supervisor, a graduate student should prepare a report that includes: the development of the structure of the lesson (seminar, practical, laboratory) on a specific issue; drawing up a working programme layout; development of a fund of appraisal funds for the discipline</p> <p>Evaluation of the success of the pedagogical practice is carried out by the supervisor on the results of the verification of the written report and its consideration at the meeting of the department in the form of test</p>
<p>If there is any connection with industry (examples could be</p>	<p>During the entire training period, students have the opportunity to:</p>

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<p>participation of industry experts in examination, accreditation practices, guest lectures?</p>	<ul style="list-style-type: none"> <li>- interact with the leaders and key specialists of enterprises and organizations whose practical activities are included in the research interests of the graduate student;</li> <li>- carry out the experimental part of the dissertation research at the production bases of enterprises and organizations - partners of the University;</li> <li>- participate in projects, lectures and other events held at the University's initiative together with domestic and foreign experts, experts in various fields of activity.</li> </ul>
<p>What ICT tools are being used in the programme?</p>	<p>During the entire period of study, students are provided with individual unlimited access to the electronic library systems (ELS) and electronic information-educational environment (EIOS) of the University. Graduate students are provided with access to the following professional databases, information reference and search engines:</p> <ol style="list-style-type: none"> <li>1. Web of Science database <a href="http://apps.webofknowledge.com">http://apps.webofknowledge.com</a>;</li> <li>2. SCOPUS database <a href="https://www.scopus.com">https://www.scopus.com</a>;</li> <li>3. Russian Science Citation Index <a href="https://elibrary.ru/">https://elibrary.ru/</a></li> <li>4. Electronic Library Company <a href="http://www.e.lanbook.com">http://www.e.lanbook.com</a>;</li> <li>5. Electronic library system "National digital resource" <a href="https://rucont.ru/">https://rucont.ru/</a>;</li> <li>6. Electronic library system ZNANIUM.com <a href="http://znanium.com/">http://znanium.com/</a>.</li> </ol> <p>The university is provided with a set of licensed software and the appropriate infrastructure necessary for the development of disciplines (modules). Software updating is carried out annually. The use of information, including the exchange of information, is carried out in compliance with the requirements of Russian and international legislation.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>During the entire period of study for graduate students the conditions for:</p> <ul style="list-style-type: none"> <li>- development of language training;</li> <li>- development of international relations in the preparation of students and the export of educational services;</li> <li>- participation in international research activities.</li> <li>- ensuring, in accordance with the requirements of the Bologna process, mobility and involvement in the international educational process.</li> </ul>

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**Analysis of PhD and teacher training programmes**
**Appendix 4 – Outcome 1.1 NMSTU, Magnitogorsk, Russia**

In this Appendix 2 it is possible to find the whole set of Outcomes 1.1. done by NMSTU (P8), Magnitogorsk, Russia. The monitoring of University's practices in PhD students' and teacher's training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

**Monitoring of PhD students teaching Programme “Electric and Thermal Technics”**

Project EXTEND 586060	Nosov Magnitogorsk State Technical University
Programme name (profile and area of study of educational programme) 13.06.01 Electric and Thermal Technics Area of study – Industrial Thermotechnics	
The total number of full-time students (statistics over 3 years)	2
The total number of part-time students (statistics over 3 years)	2
How many students are enrolled annually?	2
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	List of compulsory courses <ul style="list-style-type: none"> <li>- History and Philosophy (4 ECTS)</li> <li>- Foreign Language (2 ECTS)</li> <li>- Methodological Fundamentals of Energy Saving (3 ECTS)</li> <li>- Pedagogy and Psychology of HEI (3 ECTS)</li> <li>- Intellectual Property Protection (2 ECTS)</li> <li>- Methodology and IT in Scientific Research (4 ECTS)</li> <li>- Professionally-Oriented Translation (3 ECTS)</li> <li>- Special Discipline (3 ECTS)</li> <li>- Research on Thermophysics of Technological Processes (3 ECTS)</li> <li>- Optimization of Thermotechnical Processes and Elaboration of Optimal Systems 2 ECTS)</li> <li>- Scientific Fundamentals of Energy Saving in Thermoenergetic Systems (4 ECTS)</li> <li>- Optimization of the Combined Systems of Generation and Transformation of Energy Carriers (4 ECTS)</li> <li>- Presentation of Scientific Report on the Main Results of Scientific Qualification Paper (6 ECTS)</li> <li>- Media Culture (2 ECTS)</li> </ul> List of optional courses <ul style="list-style-type: none"> <li>- Pedagogical Practice (9 ECTS)</li> <li>- Scientific Research Activities and Preparation of Scientific Qualification Paper (192 ECTS)</li> <li>- State Examination (3 ECTS)</li> </ul>

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<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>PhD students passed their pedagogical practice at the university chairs, delivered lectures and attended lectures, seminars and workshops</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>PhD students must:</p> <ul style="list-style-type: none"> <li>- have portfolio with scientific and research achievements</li> <li>- have certificates of participating in scientific and professional conferences, seminars and workshops connected with future teaching activities</li> <li>- choose Pedagogical Practice as an optional course to be ready for teaching</li> <li>- acquire a good level of foreign language proficiency to be able to deliver lectures for foreign students</li> <li>- acquire fundamentals of inclusive education to be able to deliver lectures for inclusive students</li> </ul> <p>Assessment is carried out by means of interim and annual monitoring and control</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<ul style="list-style-type: none"> <li>- Foreign Language (2 ECTS). 2 year of study.</li> <li>- Pedagogical Practice (9 ECTS). 3 year of study</li> <li>- Pedagogy and Psychology of HEI (3 ECTS). 1 year of study.</li> <li>- Professionally-Oriented Translation (3 ECTS) 1-2 year of study. % of the total PhD programme workload/credits – 6.9%</li> </ul>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>The course “Foreign Languages” forms skills and abilities of PhD students to communicate on professional topics and covers such topics as:</p> <ul style="list-style-type: none"> <li>- Self-representation</li> <li>- The best world practices in your professional sphere</li> <li>- Styles of communication</li> <li>- Project making, etc.</li> </ul>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>Each PhD students’ group has a tutor, who is in charge of conducting teaching internship. NMSTU has a special department that organizes and controls this kind of activity. The teaching internship is assessing with the following parameters:</p> <ul style="list-style-type: none"> <li>- Attendance</li> <li>- Tasks fulfilling</li> <li>- Individual internship report</li> <li>- Tutor’s assessment and characteristics</li> </ul>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>At the final State Exam, the participants of industry are members of the Examination Board. The greater part of PhD students works at PJS “Magnitogorsk Iron and Steel Works” and its subsidiaries.</p>



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What ICT tools are being used in the programme?	Computer classes and libraries with internet access, access to university info-educational environment (educational portal, side), multimedia capacities for storing and transferring information.
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	<ul style="list-style-type: none"> <li>- Guest lecturers from partner-universities</li> <li>- International conferences</li> <li>- Studying foreign languages, including additional educational programme "Interpreter in Professional Sphere of Application"</li> </ul>

### Monitoring of Teachers' training Programme "Engineering Nets and Systems. Assembling, Starting-up, Adjustment and Exploitation of Gas-Supplying Systems. Heat-Supplying, Ventilation, Water-Supplying and Drainage Systems"

Project EXTEND 586060	Nosov Magnitogorsk State Technical University
"Engineering Nets and Systems. Assembling, Starting-up, Adjustment and Exploitation of Gas-Supplying Systems. Heat-Supplying, Ventilation, Water-Supplying and Drainage Systems"	
The total number of learners completed programme (statistics over 3 years)	9
How many teachers are enrolled annually?	3
Structure of the teacher training programme (list of topics/themes with credits)	
List of topics/themes activities with credit hours	Water-supplying and drainage systems Heat-supplying and ventilation systems
Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio	Lectures – 32 hours (44.44%) Practical work – 8 hours (11.11%) Independent work – 32 (44.44%) Total - 72
List of learning outcomes in the programme.	The learners must <ul style="list-style-type: none"> <li>- know to make projects of water-supplying systems</li> <li>- know how to calculate and choose the proper equipment</li> <li>- have critical thinking, ability to analyze, conclude and perceive information, set goals and choose ways of their achievement</li> <li>- possess mathematical ability for quantitative calculations of temperature and humid modes of the building</li> <li>- possess techniques of engineering work, technologies of model and construction designing in accordance with technical task</li> </ul>
How do you measure learning outcomes? List and give short description of how learning outcomes are being assessed, including final assessment.	Learning outcomes are assessed by exam in oral form (five-grade level), that is conducted by the examination board. The student passes the exam if his mark is higher than 3.
Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?	Lectures are the main learning tools. The ratio of active methods is 55.55 %

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How many teachers deliver the course and what is their expertise.	1-2 Associate Professors, PhD, university teachers deliver this course. Their experience of work is more 20 years.
Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	Educational portal Computer-equipped classes Models and details of construction and road machines
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	The learners get a Certificate of Excellence in improving professional competence, which have practical value – access to certain activities, right to apply for certain job.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises.
What ICT tools are being used in the programme?	Educational portal Computer-equipped classes Multimedia in lectures
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	No

## Monitoring of Teachers' training Programme "Modern Progressive Technologies, Materials and Constructions in Building and Architecture"

Project EXTEND 586060	Nosov Magnitogorsk State Technical University
Programme name and it's duration in hours/credits Modern Progressive Technologies, Materials and Constructions in Building and Architecture	
The total number of learners completed programme (statistics over 3 years)	18
How many teachers are enrolled annually?	6
Structure of the teacher training programme (list of topics/themes with credits)	
List of topics/themes activities with credit hours	Legislative, normative, legal and technical documentation regulating building activities in Russian Federation and providing the quality of construction and building  Modern building materials and constructions New progressive and energy-saving technologies in building
Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio	Lectures – 32 hours (44.44%) Practical work – 8 hours (11.11%) Independent work – 32 (44.44%) Total - 72
List of learning outcomes in the programme.	The learners must

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## Analysis of PhD and teacher training programmes

	<ul style="list-style-type: none"> <li>- know how to prepare documentation on building and reconstruction of buildings and structures</li> <li>- arrange working places and operation of manufacturing subdivisions</li> <li>- be able to observe the ecological safety</li> </ul>
How do you measure learning outcomes? List and give short description of how learning outcomes are being assessed, including final assessment.	Learning outcomes are assessed by exam in oral form (five-grade level), that is conducted by the examination board. The student passes the exam if his mark is higher than 3.
Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?	Lectures are the main learning tools. The ratio of active methods is 55.55 %
How many teachers deliver the course and what is their expertise.	1-2 Associate Professors, PhD, university teachers deliver this course. Their experience of work is more 20 years.
Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	Educational portal (with loaded on-line presentations) Computer-equipped classes Communication with teachers, feedback via educational portal and in oral form
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	The learners get a Certificate of Excellence in improving professional competence, which have practical value – access to certain activities, right to apply for certain job.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	There is a direct connection with industry. Learners and members of the examination board are representatives of industrial enterprises.
What ICT tools are being used in the programme?	Educational portal Computer-equipped classes Multimedia in lectures
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	No

## Monitoring of the Teacher Training Programme “Information and Communication Technologies in the Activities of a Higher Education Institution”

Project EXTEND 586060	Nosov Magnitogorsk State Technical University
Programme name and it's duration in hours/credits INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE ACTIVITIES OF A HIGHER EDUCATIONAL INSTITUTION	
The total number of learners completed programme (statistics over 3 years)	2-3
Structure of the teacher training programme (list of topics/themes with credits)	
List of topics/themes activities with credit hours	The volume of the additional professional advanced training programme is 2 credits, including 0.2 credits, lecture lessons, 0.8 credits practical lessons, 1 credit independent work.

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	<p>The programme structure includes the following modules:</p> <ol style="list-style-type: none"> <li>1) Regulatory legal support of educational activities in the context of the new legislation in the field of education (e-learning) - 0.2 credit;</li> <li>2) Information technology in the implementation of information and information-activity learning models - 0.2 credit;</li> <li>3) The development of e-learning and the use of distance learning technologies in the educational process at the university - 0.32 credit;</li> <li>4) Information technology in the implementation of a system for monitoring, evaluating and monitoring students' academic achievements - 0.32 credit;</li> <li>5) The development of e-learning and the use of distance learning technologies in the educational process at the university - 0.32 credit;</li> <li>6) Methodological aspects of the use of information technology in the educational process - 0.32 credit;</li> <li>7) Workshop on the use of information technology in education - 0.32 credit.</li> </ol>
<p>Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio</p>	<p>Module 1 "Regulatory legal support of educational activities in the context of the new legislation in the field of education (e-learning)": Total: 0.2 credits, of which 33% are lectures, 67% are independent work.</p> <p>Module 2 "Information technologies in the implementation of information and information-activity learning models": Total: 0.2 credits, of which 67% are lectures, 33% are independent work.</p> <p>Module 3 "The development of e-learning and the use of distance learning technologies in the educational process at the university": Total: 0.32 credit, 50% of them are lectures, 50% are independent work.</p> <p>Module 4 "Information technologies in the implementation of a system for monitoring, evaluating and monitoring students' academic achievements": Total: 0.32 credit, 50% of them are lectures, 50% are independent work.</p> <p>Module 5 "The development of e-learning and the use of distance learning technologies in the educational process at the university": Total: 0.32 credit, 50% of them are lectures, 50% are independent work.</p> <p>Module 6 "Methodological aspects of the use of information technology in the educational process" Total: 0.32 credit, 50% of them are lectures, 50% are independent work.</p> <p>Module 7 "Workshop on the use of information technology in education"</p>

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	Total: 0.32 credit, 50% of them are lectures, 50% are independent work.
List of learning outcomes in the programme.	The programme is directed at the formation of knowledge and the development of professional competencies of university teachers in the use of modern information and communication technologies.
How do you measure learning outcomes? List and give short description of how learning outcomes connected are being assessed, including final assessment.	At the end of the course, students should form knowledge and skills on the following issues: 1) the formation of the regulatory and methodological framework for the use of modern educational technologies in the educational process of the university; 2) the specifics and possibilities of using e-learning and distance learning technologies in the educational process at the university; 3) the use of information technology in the implementation of a system for monitoring, evaluating and monitoring students' educational achievements; 4) the skills to create and maintain electronic educational content. To control the level of preparedness of students, oral surveys, interviews, testing are used. Upon completion of the course is expected final certification in the form of offset.
Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?	The main types of contact work are lectures and practical exercises. The structure of contact work - 20% to 80%. The active methods and tools of working with students in the framework of contact work include intergroup discussions, solving situational problems, simulation games and training. The independent work of students makes up 50% of the course and involves the study of lecture material, textbooks, regulatory legal acts, materials of pedagogical practice, preparation of reports, reports, and performances in group classes.
How many teachers deliver the course and what is their expertise.	5 people, including 3 candidates of sciences, 2 not undergrads. 4 teachers are not only scientific, but also practical activities in the field of pedagogy and information and communication technologies.
Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	During the implementation of educational programmes, various educational technologies are used, including distance learning technologies, e-learning based on LMS Moodle.
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	According to the results of training, a certificate of advanced training is issued, which, along with the education certificate, confirms the right of its holder to engage in teaching activities and perform relevant labor functions.

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**Analysis of PhD and teacher training programmes**

**Monitoring of the Teacher Training Programme “Pedagogy and Psychology of Professional Activity of the Teacher of the Higher School (“Information and Communication Technologies”)”**

Project EXTEND 586060	Nosov Magnitogorsk State Technical University
Programme name and it’s duration in hours/credits PEDAGOGY AND PSYCHOLOGY OF PROFESSIONAL ACTIVITY OF THE TEACHER OF THE HIGHER SCHOOL ("INFORMATION AND COMMUNICATION TECHNOLOGIES")	
The total number of learners completed programme (statistics over 3 years)	4-5
Structure of the teacher training programme (list of topics/themes with credits)	
List of topics/themes activities with credit hours	The volume of the additional professional advanced training programme is 2 credits. The programme structure includes the following modules: 1) Pedagogical problems and the foundations of pedagogical skills of a higher school teacher - 0.8 credits; 2) Psychological foundations of professional activities of a higher school teacher - 0.5 credit; 3) Technology of organization of professional academic interaction at the university - 0.2 credit; 4) Information and communication technology - 0.5 credit.
Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio	Module 1 "Pedagogical problems and the foundations of pedagogical skills of a higher school teacher": Total: 0.8 credits, of which 38% are lectures, 62% are practical. Module 2 "Psychological foundations of professional activities of a higher education teacher": Total: 0.5 loans, of which 70% are lectures, 30% are practical. Module 3 "Technology of the organization of professional academic cooperation in high school" Total: 0.2 credit, 50% of them are lectures, 50% are practical. Module 4 "Information and communication technologies" Total: 0.5 credit, of which 45% are lectures, 55% are practical.
List of learning outcomes in the programme.	The programme is directed at the formation of the psychological and pedagogical competencies of university teachers; the training of teachers for the use of psychological and pedagogical, including information and communication, technologies in professional activities.
How do you measure learning outcomes? List and give short description of how learning outcomes connected are being assessed, including final assessment.	At the end of the course, students should form knowledge and skills on the following issues: 1) development of scientific and methodological support for the implementation of academic subjects, courses, disciplines (modules); 2) teaching of subjects, courses, disciplines (modules) in undergraduate programmes, specialty, graduate programmes and additional professional programmes;

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	<p>3) professional support of specialists involved in the implementation of academic subjects, courses, disciplines (modules), organization of research, design and other activities of students;</p> <p>4) management of research, project, educational, professional and other activities of students;</p> <p>5) career guidance activities;</p> <p>6) social and pedagogical support of students in educational activities and professional and personal development.</p> <p>To control the level of preparedness of students, oral surveys, interviews, testing are used.</p> <p>Upon completion of the course is expected final certification in the form of offset.</p>
Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?	<p>The main types of contact work are lectures and practical exercises. The structure of contact work - 50% to 50%.</p> <p>The active methods and tools of working with students in the framework of contact work include intergroup discussions, solving situational problems, simulation games and training.</p> <p>The independent work of students involves the study of lecture material, textbooks, regulations, materials of teaching practice, the preparation of reports, reports, presentations in group classes.</p>
How many teachers deliver the course and what is their expertise.	<p>6 people, including 3 candidates of science, 2 doctors of science, 1 non-graduate.</p> <p>3 teachers conduct not only scientific but also practical activities in the field of psychology and pedagogy.</p>
Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	<p>During the implementation of educational programmes, various educational technologies are used, including distance learning technologies, e-learning based on LMS Moodle.</p>
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	<p>According to the results of training, a certificate of advanced training is issued, which, along with the education certificate, confirms the right of its holder to engage in teaching activities and perform relevant labor functions.</p>

### Monitoring of the Teacher Training Programme “Modern Educational Technologies in the University (Information and Communication Technologies)”

Project EXTEND 586060	Nosov Magnitogorsk State Technical University
<p>Programme name and it’s duration in hours/credits</p> <p>MODERN EDUCATIONAL TECHNOLOGIES IN THE UNIVERSITY (INFORMATION AND COMMUNICATION TECHNOLOGIES)</p>	
The total number of learners completed programme (statistics over 3 years)	3-4
Structure of the teacher training programme (list of topics/themes with credits)	

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<p>List of topics/themes activities with credit hours</p>	<p>The volume of the additional professional advanced training programme is 2 credits, including 0.5 credits lecture lessons, 0.5 credits practical lessons, 1 credit independent work.</p> <p>The programme structure includes the following modules:</p> <ol style="list-style-type: none"> <li>1) The technological approach and the specifics of its implementation in the field of education - 0.3 credit;</li> <li>2) Technology training and education in high school. Methods of teaching specialized disciplines - 0.7 credits;</li> <li>3) Technologies for enhancing the communicative competence of a higher education teacher - 0.3 credits;</li> <li>4) Technology organization of professional academic cooperation in the university - 0.3 credit;</li> <li>5) Information technology at the university - 0.4 credit</li> </ol>
<p>Structure of the programme (number of contact hours, number of independent work of learners, other types of activities if applicable) ratio</p>	<p>Module 1 "Technological approach and the specifics of its implementation in the field of education": Total: 0.3 loans, of which 17% are lectures, 17% are practical exercises, 66% are independent work.</p> <p>Module 2 "Technology training and education in high school. Methods of teaching specialized discipline ": Total: 0.7 credits, of which 33% - lectures, 33% practical classes, 34% - independent work.</p> <p>Module 3 "Technologies for enhancing the communicative competence of a higher school teacher": Total: 0.3 loans, of which 17% are lectures, 17% are practical exercises, 66% are independent work.</p> <p>Module 4 "Technologies of organization of professional academic cooperation in the university": Total: 0.3 loans, of which 20% are lectures, 20% are practical exercises, 60% are independent work.</p> <p>Module 5 "Information technology in high school": Total: 0.4 loans, of which 29% are lectures, 29% are practical exercises, 42% are independent work.</p>
<p>List of learning outcomes in the programme.</p>	<p>The programme is directed at the formation of knowledge and the development of professional competencies of university teachers in the use of modern educational technologies.</p>
<p>How do you measure learning outcomes? List and give short description of how learning outcomes connected are being assessed, including final assessment.</p>	<p>At the end of the course, students should form knowledge and skills on the following issues:</p> <ol style="list-style-type: none"> <li>1) the formation of the regulatory and methodological framework for the use of modern educational technologies in the educational process of the university;</li> <li>2) psychological and pedagogical features of the use of modern educational technologies in high school;</li> <li>3) the formation of the ability to simulate the educational process using modern educational technologies;</li> <li>4) development of skills in the use of active and interactive educational technologies in the educational process at the university;</li> <li>5) the specificity and possibilities of using e-learning and distance learning technologies in the educational process at the university.</li> </ol> <p>To control the level of preparedness of students, oral surveys, interviews, testing are used.</p>



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## Analysis of PhD and teacher training programmes

	Upon completion of the course is expected final certification in the form of offset.
Describe teaching and learning tools implemented in the course to deliver information and achieve learning outcomes. What is the ratio of active methods?	The main types of contact work are lectures and practical exercises. The structure of contact work - 50% to 50%. The active methods and tools of working with students in the framework of contact work include intergroup discussions, solving situational problems, simulation games and training. The independent work of students makes up 50% of the course and involves the study of lecture material, textbooks, regulatory legal acts, materials of pedagogical practice, preparation of reports, reports, and performances in group classes.
How many teachers deliver the course and what is their expertise.	11 people, including 1 doctor of science, 9 candidates of science, 1 non-graduate. 5 teachers conduct not only scientific, but also practical activities in the field of pedagogy and psychology.
Describe e-support provided in the course (presentations and other teaching materials provided on-line, communication platform for learners, communication with teachers, homework, assignments etc.)	During the implementation of educational programmes, various educational technologies are used, including distance learning technologies, e-learning based on LMS Moodle.
What kind of documents learner get upon completion of the course. Does it have practical value – access to certain activities, right to apply for certain job.	According to the results of training, a certificate of advanced training is issued, which, along with the education certificate, confirms the right of its holder to engage in teaching activities and perform relevant labor functions.

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## Analysis of PhD and teacher training programmes

### Appendix 5 – Outcome 1.1 TUT, Dushanbe, Tajikistan

In this Appendix it is possible to find the whole set of Outcomes 1.1. done by Technological University of Tajikistan, Dushanbe, Tajikistan. The monitoring of University’s practices in PhD students’ and teacher’s training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

### Monitoring of PhD students teaching Programme “Process, Aggregates and Equipment in Food Industry”

Project EXTEND 586060	Technological University of Tajikistan
Process, Aggregates and Equipment in Food Industry	
The total number of full-time students (statistics over 3 years)	1
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory 1. Education Methods in higher education institutions (1.5 credits) 2. Research Methods (1.5 credits) Elective Subjects (12 credits) Mathematical modelling in scientific research Innovation development in food industry Modern process and equipment in food production Food Safety in the republic of Tajikistan Specialization subjects Mandatory (12 credits) Theory of technological process in food production (6 credits) The bases of project planning and equipment in food industry (6 credits) Elective subjects (12 credits) Modern equipment in food production (1.5 credits) Technology of equipment, apparatus and technological process in Food Industry (1.5 credits) Methods of experimental planning (1.5 credits) Modern control methods (1.5 credits) Bases of scientific research and experimental techniques (1.5 credits) Thermo-physical bases of food production (1.5 credits) Nanotechnology in the field. (1.5 credits) Basic laws of technological process (1.5 credits) Research and laboratory work (72 credits) Writing the dissertation (45 credits) Pedagogy and professional (scientific) internships (21credits)

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## Analysis of PhD and teacher training programmes

	Pedagogy internship (9 credits) Professional internship (scientific) 12credits Term attestation Final attestation 3 credits Final exam 3 credits Dissertation defense Total: 180 credits
If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.	The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities, which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.
How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?	Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.
List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).	Education Methods in higher education institutes (1.5 credits first semester) Innovation development in food industry (6 credits first semester) Modern process and equipment in food production (6 credits first semester) Food Safety in the republic of Tajikistan (6 credits first semester) Theory of technological process in food production (6 credits first semester) The bases of project planning and equipment in food industry (6 credits first semester) Modern equipment in food production (1.5 credits 2 <sup>nd</sup> semester) Technology of equipment, apparatus and technological process in Food Industry (1.5 credits 2 <sup>nd</sup> semester) Methods of experimental planning (1.5 credits 2 <sup>nd</sup> semester) Modern control and inspection methods (1.5 credits 2 <sup>nd</sup> semester) Basics of thermo-physics in food production (1.5 credits 2 <sup>nd</sup> semester) Nanotechnology in the field (1.5 credits 2 <sup>nd</sup> semester) Basic laws of technological process (1.5 credits 2 <sup>nd</sup> semester)
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	No data
Describe how teaching internship is organized for PhD students (what type of activities students perform during	The internships are organized by the education department through mutual agreement with the host organization. During the internship’s students conduct experiments in the laboratories and conduct research

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## Analysis of PhD and teacher training programmes

internship, how it is assessed, who is in charge of organization).	and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	No data
What ICT tools are being used in the programme?	Power-point presentation, MS office (Excel is applied to perform statistical evaluation and analysis, projector, electronic board, relevant software programmes I in the laboratory of food production
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students.

## Monitoring of Teachers' training Programme "Process, Aggregates and Equipment in Light Industry (Textile)"

Project EXTEND 586060	Technological University of Tajikistan
Process, Aggregates and Equipment in Light Industry (Textile)	
The total number of full-time students (statistics over 3 years)	1
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits) Mathematical modelling in scientific research Innovation development in textile industry Modern process and equipment in Textile Specialization subjects Mandatory (12 credits) Theory of technological process textile industry (6 credits) The bases of project planning and equipment in light industry (textile) (6 credits) Elective subjects (12 credits) Modern equipment in textile design and technology (1.5 credits) Technology and design, equipment and technological process in textile industry (1.5 credits) Methods of experimental planning (1.5 credits) Modern control methods (1.5 credits) Bases of scientific research and experimental techniques (1.5 credits) Nanotechnology in the field (1.5 credits) Basic laws of technological process (1.5 credits) Research and laboratory work 72 credits

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## Analysis of PhD and teacher training programmes

	Writing the dissertation (45 credits) Pedagogy and professional (scientific) internships (21credits) Pedagogy internship (9 credits) Professional internship (scientific) 12credits Term attestation Final attestation 3 credits Final exam 3 credits Dissertation defense Total: 180 credits
If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.	The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.
How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?	Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.
List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).	Education Methods in higher education institutes (1.5 credits first semester) Innovation development in textile industry (6 credits first semester) Modern process in textile design and technology (6 credits first semester) Theory and technological process in textile industry (6 credits first semester) The bases of project planning and equipment in textile industry (6 credits first semester) Modern equipment in Textile Industry (1.5 credits 2 <sup>nd</sup> semester) Technology and design, equipment and technological process in textile industry (1.5 credits 2 <sup>nd</sup> semester) Methods of experimental planning (1.5 credits 2 <sup>nd</sup> semester) Modern control and inspection methods (1.5 credits 2 <sup>nd</sup> semester) Nanotechnology in the field (1.5 credits 2 <sup>nd</sup> semester) Basic laws of technological process (1.5 credits 2 <sup>nd</sup> semester)
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	No data
Describe how teaching internship is organized for PhD students (what type of activities students perform during	The internships are organized by the education department through mutual agreement with the host organization. During the internship’s students conduct experiments in the laboratories and conduct research

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internship, how it is assessed, who is in charge of organization).	and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	No data
What ICT tools are being used in the programme?	Power-point presentation, MS office (Excel is applied to perform statistical evaluation and analysis), Projector, Electronic board, relevant software programmes I in the laboratory of food production
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students and its assessed in the final exam.

### Monitoring of teacher training Programme “Computing machines programming and mathematical ensure, computer networks and complexes”

Project EXTEND 586060	Technological University of Tajikistan
Computing machines programming and mathematical ensure, computer networks and complexes	
The total number of full-time students (statistics over 3 years)	3
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits) Virtual computing technology (6 credits) Information defense models and methods (6 credits) Knowledge view in information system (6 credits) Applied Econometrics (6 credits) Specialization subjects Mandatory (12 credits) Mathematical modelling (6 credits) Bases of scientific research (6 credits) Elective subjects (12 credits) Differential equation (1.5 credits) Innovation Technologies in Science (1.5 credits) Network technology information management and process, means and methods (1.5 credits) Computing methods (3 credits (1.5 credits) Complex systems design (1.5 credits) Socio-economic system design (1.5 credit)

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	<p>Software technology (1.5 credits)          Programme development in high level programming languages (1.5 credits)          Research and laboratory work 72 credits          Pedagogy and professional (scientific) internships (21credits)          Pedagogy internship (9 credits)          Professional internship (scientific) 12credits          Term attestation          Final attestation 3 credits          Final exam 3 credits          Dissertation defense          Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Education Methods in higher education institutes (1.5 credits first semester)          Virtual computing technology (6 credits 1<sup>st</sup> semester)          Information defense models and methods (6 credits 1<sup>st</sup> semester)          Knowledge view in information system (6 credits 1<sup>st</sup> semester)          Applied Econometrics (6 credits 1<sup>st</sup> semester)          Mathematical modelling (6 credits 1<sup>st</sup> semester)          Differential equation (3 credits 2<sup>nd</sup> semester)          Innovation Technologies in Science (3 credits 2<sup>nd</sup> semester)          Network technology information management and process, means and methods (3 credits 2<sup>nd</sup> semester)          Computing methods (3 credits (1.5 credits 2<sup>nd</sup> semester)          Complex systems design (1.5 credits 2<sup>nd</sup> semester)          Socio-economic system design (1.5 credit 2<sup>nd</sup> semester)          Software technology (1.5 credits 2<sup>nd</sup> semester)          Programme development in high level programming languages (1.5 credits 2<sup>nd</sup> semester)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>No data</p>

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## Analysis of PhD and teacher training programmes

Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	The internship is been organized by the education department through mutual agreement with the host organization. During the internship, students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	No data
What ICT tools are being used in the programme?	Power-point presentation, MS office (Excel is applied to preform statistical evaluation and analysis, Projector, Electronic board, relevant software programmes I in the laboratory of food production
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students and its assessed in the final exam.

### Monitoring of teacher training Programme “Technological process and storage of cereals, grains, beans, grains products, fruits and viticulture”

Project EXTEND 586060	Technological University of Tajikistan
Technological process and storage of cereals, grains, beans, grains products, fruits and viticulture	
The total number of full-time students (statistics over 3 years)	0
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	0
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits) Scientific and theoretical bases of fruits and viticulture technology (6 credits) Scientific and theoretical bases of cereals technology (6 credits) Control and commodity research of fruits and viticulture (3 credits) Control and commodity research of cereals and beans (3 credits) Specialization subjects Mandatory (12 credits) Waste less technology in the production on cereal, beans, fruits and viticulture (6 credits) Technological development in the production of cereal, beans, fruits and viticulture (6 credits) Elective subjects (12 credits) Beans and cereals chemistry (1.5 credits)



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	Fruits and viticulture chemistry (1.5 credits) Quality management (1.5 credits) Basics of resource saving in the field (1.5 credits) Chemical substitutes (1.5 credits) Bread biochemistry, fruits and wine (1.5 credits) Issues of resource recycling (1.5 credits) Innovation technology in production (1.5 credit) Research and laboratory works (72 credits) Writing the dissertation (45 credits) Pedagogy and professional (scientific) internships (21credits) Pedagogy internship (9 credits) Professional internship (scientific) 12credits Term attestation Final attestation 3 credits Final exam 3 credits Dissertation defense Total: 180 credits
If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.	The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.
How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?	Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.
List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).	Education Methods in higher education institutes (1.5 credits first semester) Control and commodity research of fruits and viticulture (3 credits 1 <sup>st</sup> semester) Control and commodity research of cereals and beans 3 credits 1 <sup>st</sup> semester) Waste less technology in the production on cereal, beans, fruits and viticulture (6 credits 1 <sup>st</sup> semester) Technological development in the production of cereal, beans, fruits and viticulture (6 credits 1 <sup>st</sup> semester) Beans and cereals chemical compounds (1.5 credits 2 <sup>nd</sup> semester) Fruits and viticulture chemical compounds (1.5 credits 2 <sup>nd</sup> semester) Quality management (1.5 credits 2 <sup>nd</sup> semester) Basics of resource saving in the field (1.5 credits 2 <sup>nd</sup> semester) Chemical substitutes (1.5 credits 2 <sup>nd</sup> semester) Bread biochemistry, fruits and wine (1.5 credits 2 <sup>nd</sup> semester) Issues of resource recycling (1.5 credits 2 <sup>nd</sup> semester)

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	Innovation technology in production (1.5 credit 2 <sup>nd</sup> semester)
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	No data
Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	The internships are organized by the education department through mutual agreement with the host organization. During the internship's students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	No data
What ICT tools are being used in the programme?	Power-point presentation MS office (Excel is applied to perform statistical evaluation and analysis) Projector Electronic board Relevant software programmes I in the laboratory of food production
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students and its assessed in the final exam.

### Monitoring of teacher training Programme “Meat, dairy, fish products Technology and production of refrigerators”

Project EXTEND 586060	Technological University of Tajikistan
Meat, dairy, fish products Technology and production of refrigerators	
The total number of full-time students (statistics over 3 years)	3
The total number of part-time students (statistics over 3 years)	3
How many students are enrolled annually?	0
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits) Meat and fish chemical compounds (1.5 credits) Milk chemical compounds (1.5 credits) Theoretical bases of fish and meat technology (3 credits)

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	<p>Theoretical bases of dairy technology (3 credits)</p> <p>Specialization subjects</p> <p>Mandatory (12 credits)</p> <p>Waste less technology in the production of meat, fish, and dairy (6 credits)</p> <p>Technological development in the production of meat, fish, and dairy (6 credits)</p> <p>Elective subjects (12 credits)</p> <p>Quality management (1.5 credits)</p> <p>Control and commodity research of meat and fish products (1.5 credits)</p> <p>Control and commodity research of dairy products (1.5 credits)</p> <p>Modern methods of identification and inspection (1.5 credits)</p> <p>Chemical substitutes (3 credits)</p> <p>Active biological additives (1.5 credits)</p> <p>Modern technologies in the production of meat, fish and dairy products (1.5 credits)</p> <p>Innovation technology in production (1.5 credits)</p> <p>Research and laboratory work (72 credits)</p> <p>Writing the dissertation (45 credits)</p> <p>Pedagogy and professional (scientific) internships (21credits)</p> <p>Pedagogy internship (9 credits)</p> <p>Professional internship (scientific) 12credits</p> <p>Term attestation</p> <p>Final attestation 3 credits</p> <p>Final exam 3 credits</p> <p>Dissertation defense</p> <p>Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the</p>	<p>Education Methods in higher education institutes (1.5 credits first semester)</p> <p>Meat and fish chemical compounds (1.5 credits)</p> <p>Milk chemical compounds (1.5 credits 1<sup>st</sup> semester)</p>

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<p>programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Theoretical bases of fish and meat technology (3 credits 1<sup>st</sup> semester)  Theoretical bases of dairy technology (3 credits 1<sup>st</sup> semester)  Waste less technology in the production of meat, fish, and dairy (6 credits 1<sup>st</sup> semester)  Technological development in the production of meat, fish, and dairy (6 credits 2<sup>nd</sup> semester)  Quality management (1.5 credits 2<sup>nd</sup> semester)  Control and commodity research of meat and fish products (1.5 credits 2<sup>nd</sup> semester)  Control and commodity research of dairy products (1.5 credits 2<sup>nd</sup> semester)  Modern methods of identification and inspection (1.5 credits 2<sup>nd</sup> semester)  Chemical substitutes (1.5 credits 2<sup>nd</sup> semester)  Active biological additives (1.5 credits 2<sup>nd</sup> semester)  Modern technologies in the production of meat, fish and dairy products (1.5 credits 2<sup>nd</sup> semester)  Innovation technology in production (1.5 credits 2<sup>nd</sup> semester)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>No data</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>The internships are organized by the education department through mutual agreement with the host organization. During the internships students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>No data</p>
<p>What ICT tools are being used in the programme?</p>	<p>Power-point presentation  MS office (Excel is applied to perform statistical evaluation and analysis) Projector  Electronic board  Relevant software programmes I in the laboratory of food production</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>Knowledge of Russian and English languages are mandatory for PhD students and its assessed in the final exam.</p>

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### Appendix 6 – Outcome 1.1 KulSU, Kulob, Tajikistan

In this Appendix 2 it is possible to find the whole set of Outcomes 1.1. done by Kulob State University named after Abuabdulloh Rudaki, Tajikistan. The monitoring of University’s practices in PhD students’ and teacher’s training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

#### Monitoring of PhD students Programme “Physics”

Project EXTEND 586060	Kulob State University named after Abuabdulloh Rudaki
PhD on “Physics” – 6D011000	
The total number of full-time students (statistics over 3 years)	1
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits or 2 subjects) English (3or 6 credits) German (3or 6 credits) Software for Mathematical Processing (Mathlab, MathCad) (3or 6 credits) Computer based processing of Scientific analyzes (3or 6 credits) Specialization subjects Mandatory (12 credits) The major issues of modern Physics (6 credits) The basis of nanotechnology physics (6 credits) Elective subjects (12 credits) Radio astronomy (1.5 credits) The basis of electronic physics (1.5 credits) The History of Astronomy and Physics (1.5 credits) Thermo - Physics (1.5 credits) The half-thin Physics (1.5 credits) Practice of half-thin Physics (1.5 credits) Theory of solid metals and molecular crystals (1.5 credits) Basic of Logic-Psychological issues of Physical problems (1.5 credits) Research and laboratory work (72 credits) Writing the dissertation (45 credits) Pedagogy and professional (scientific) internships (21credits)

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	<p>Pedagogy internship (9 credits) Professional internship (scientific) 12credits Term attestation Final attestation 3 credits Final exam 3 credits Dissertation defense Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this is a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. Also, those who has PhD degree Diploma by the decision of Higher Accreditation Commission will be motivated financially (will get more as salary) However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Education Methods in higher education institutes (1.5 credits first semester) The major issues of modern Physics (6 credits) The basis of nanotechnology physics (6 credits) Radio astronomy (1.5 credits) The basis of electronic physics (1.5 credits) The History of Astronomy and Physics (1.5 credits) Thermo - Physics (1.5 credits) The half-thin Physics (1.5 credits) Practice of half-thin Physics (1.5 credits) Theory of solid metals and molecular crystals (1.5 credits) Basic of Logic-Psychological issues of Physical problems (1.5 credits) Pedagogy internship (9 credits) Professional (scientific) internship (12credits)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>No data</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is</p>	<p>The internships are organized by the Science department and education department in home Institution or through mutual agreement with the host organization. During the internship’s students conduct experiments in the laboratories and conduct research and development upon the</p>

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assessed, who is in charge of organization).	request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	While providing the experiments the students visit the industry and provide their experiments their
What ICT tools are being used in the programme?	Power-point presentation MS office (Excel is applied to perform statistical evaluation and analysis) MathLab, MathCad, Projector, Electronic board Relevant software programmes I in the laboratories where the students provide their expertise
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students. Sometimes they will arrive to foreign HEIs for learning best practices.

## Monitoring of PhD students Programme “Mathematics”

Project EXTEND 586060	Kulob State University named after Abuabdulloh Rudaki
PhD on “Mathematics” – 6D010200	
The total number of full-time students (statistics over 3 years)	2
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits) English (3or 6 credits) German (3or 6 credits) Software for Mathematical Processing (Mathlab, MathCad) (3or 6 credits) Computer based processing of Scientific analyzes (3or 6 credits) Specialization subjects <div style="text-align: right;">Mandatory (12 credits)</div> 3. Real Analyzing (6 credits) 4. Complex Analyzing (6 credits) Elective subjects (12 credits) Functional Analyzing (1.5 credits)

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	<p>The side problems of the theory of functional and general analytics (1.5 credits)</p> <p>The differential equations (1.5 credits)</p> <p>The special integral equations (1.5 credits)</p> <p>Theory and Methods of teaching Mathematics (1.5 credits)</p> <p>Efficacy of teaching process (1.5 credits)</p> <p>The elements of stereometry (1.5 credits)</p> <p>The elements of trigonometry (1.5 credits)</p> <p>Research and laboratory work (72 credits)</p> <p>Writing the dissertation (45 credits)</p> <p>Pedagogy and professional (scientific) internships (21credits)</p> <p>Pedagogy internship (9 credits)</p> <p>Professional internship (scientific) 12credits</p> <p>Term attestation</p> <p>Final attestation 3 credits</p> <p>Final exam 3 credits</p> <p>Dissertation defense</p> <p>Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this is strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. Also, those who has PhD degree Diploma by the decision of Higher Accreditation Commission will be motivated financially (will get more as salary) However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Education Methods in higher education institutions (1.5 credits)</p> <p>Research Methods (1.5 credits)</p> <p>Software for Mathematical Processing (Mathlab, MathCad) (3or 6 credits)</p> <p>Computer based processing of Scientific analyzes (3or 6 credits)</p> <p>Real Analyzing (6 credits)</p> <p>Complex Analyzing (6 credits)</p> <p>Functional Analyzing (1.5 credits)</p> <p>The side problems of the theory of functional and general analytics (1.5 credits)</p> <p>The differential equations (1.5 credits)</p> <p>The special integral equations (1.5 credits)</p> <p>Theory and Methods of teaching Mathematics (1.5 credits)</p> <p>Efficacy of teaching process (1.5 credits)</p> <p>The elements of stereometry (1.5 credits)</p> <p>The elements of trigonometry (1.5 credits)</p>



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	Pedagogy internship (9 credits) Professional (scientific) internship (12credits)
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	No data
Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	The internships are organized by the education department and Science departments in home Institution or through mutual agreement with the host organization. During the internship's students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	While providing the experiments the students visit the industry and provide their experiments their
What ICT tools are being used in the programme?	Power-point presentation MS office (Excel is applied to preform statistical evaluation and analysis) MathLab, MathCad Projector Electronic board Relevant software programmes I in the laboratories where the students provide their expertise
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages is mandatory for PhD students. Sometimes they will arrive to foreign HEIs for learning best practices.

### Monitoring of PhD students Programme "Informatics"

Project EXTEND 586060	Kulob State University named after Abuabdulloh Rudaki
PhD on "Informatics" – 6D011100	
The total number of full-time students (statistics over 3 years)	2
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	2
Structure of the PhD programme (list of courses, internships and research with credits)	

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<p>List of courses, internships and research activities with credit hours</p>	<p>Main Subjects Mandatory Education Methods in higher education institutions (1.5 credits) Research Methods (1.5 credits) Elective Subjects (12 credits or 2 subjects) English (3or 6 credits) German (3or 6 credits) Software for Mathematical Processing (Mathlab, MathCad) (3or 6 credits) Computer based processing of Scientific analyzes (3or 6 credits) Specialization subjects Mandatory (12 credits) The new technologies in Science and Education (6 credits) The high-level programmeming languages (6 credits) Elective subjects (12 credits) Information Safety (1.5 credits) Expert Systems (1.5 credits) The practice of computer science problem solving (1.5 credits) The basis of web-programmeming (1.5 credits) The artificial intelligence (1.5 credits) Computer modeling (1.5 credits) Multimedia and computer graphics (1.5 credits) Technology of software development (1.5 credits) Research and laboratory work (72 credits) Writing the dissertation (45 credits) Pedagogy and professional (scientific) internships (21credits) Pedagogy internship (9 credits) Professional internship (scientific) 12credits Term attestation Final attestation 3 credits Final exam 3 credits Dissertation defense Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this is strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead student’s research and independent works as they have a strong knowledge in research methods and experimental design.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. Also, those who has PhD degree Diploma by the decision of Higher Accreditation Commission will be motivated financially (will get more as salary) However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>

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<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Education Methods in higher education institutions (1.5 credits)          Research Methods (1.5 credits)          Software for Mathematical Processing (Mathlab, MathCad) (3or 6 credits)          Computer based processing of Scientific analyzes (3or 6 credits)          The new technologies in Science and Education (6 credits)          The high-level programmeming languages (6 credits)          Information Safety (1.5 credits)          Expert Systems (1.5 credits)          The practice of computer science problem solving (1.5 credits)          The basis of web-programmeming (1.5 credits)          The artificial intelligence (1.5 credits)          Computer modeling (1.5 credits)          Multimedia and computer graphics (1.5 credits)          Technology of software development (1.5 credits)          Pedagogy internship (9 credits)          Professional (scientific) internship (12credits)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>No data</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>The internships are organized by the Science department and education department in home Institution or through mutual agreement with the host organization. During the internship’s students conduct experiments in the laboratories, different organizations, secondary schools (for providing some methodical experiments) and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>No data</p>
<p>What ICT tools are being used in the programme?</p>	<p>Power-point presentation, MS office (Excel is applied to preform statistical evaluation and analysis) MathLab, MathCad, Projector, Electronic board, Relevant software programmes in the laboratories where the students provide their expertise</p>
<p>Is there any international element in the programme? (mobility, languages, guest lectures?)</p>	<p>Knowledge of Russian and English languages is mandatory for PhD students. Sometimes they will arrive to foreign HEIs for learning best practices.</p>

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**Analysis of PhD and teacher training programmes**
**Appendix 7 – Outcome 1.1 TNU, Dushanbe, Takijistan**

In this Appendix 2 it is possible to find the whole set of Outcomes 1.1. done by Tajik National University, Dushanbe, Tajikistan. The monitoring of University’s practices in PhD students’ and teacher’s training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

**Monitoring of PhD students Programme “Methodology, Standardization and Certification”**

Project EXTEND 586060	TAJIK NATIONAL UNIVERSITY
Programme name (profile and area of study of educational programme) METROLOGY STANDARDIZATION AND CERTIFICATION	
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)
The total number of full-time students (statistics over 3 years)	1
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main items list – 15 credits, (self-study – 9 credits) Teaching methods in high schools – 1,5 credits, (self-study – 1 credits) The science research methodology – 1,5 credits, (self-study – 1 credits) Part of the items to choose from (2 subjects) – 12 credits, (self-study – 8 credits) English – 2 credits. German – 2 credits. French – 2 credits. Computer programmes of mathematical processing – 2 credits. Computer processing of the results of scientific experiments – 2 credits. Specialty subjects – 24 credits, (self-study – 16 credits) Part of the compulsory subjects – 12 credits, (self-study – 8 credits) Qualimetry and qualimetric analysis – 6 credits, (self-study – 4 credits) Metrology and metrological assurance of industrial products – 6 credits, (self-study – 4 credits) Part of the items to choose from (4 subjects) – 12 credits, (self-study – 8 credits) Metrological support of technological processes and production – 2 credits. Product quality control technology – 2 credits.

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## Analysis of PhD and teacher training programmes

	<p>Computerization of measurement and control. 2 credits. Metrological means of control, measurement and diagnostics – 2 credits.</p> <p>Standardization and certification – 2 credits.</p> <p>Economics of metrological assurance – 2 credits.</p> <p>Overall quality management – 2 credits.</p> <p>Measurement accuracy theory – 2 credits.</p> <p>Research work and experiments. 72 credits, (self-study – 60 credits)</p> <p>Doctoral dissertation in the specialty – 45 credits, (self-study – 37 credits)</p> <p>Teaching practice – 9 credits, (self-study – 7 credits)</p> <p>Professional internship (scientific) – 12credits, (self-study – 10 credits)</p> <p>Term attestation</p> <p>Final attestation – 3 credits, (self-study – 2 credits)</p> <p>Final exam – 3 credits, (self-study – 2 credits)</p> <p>Dissertation defense</p> <p>Self-study – 141 credits. Total: – 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on "postgraduate education" and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Teaching methods in high schools – 1,5 credits. (first semester)</p> <p>The science research methodology – 1,5 credits. (first semester)</p> <p>Computer programmes of mathematical processing – 2 credits. (second semester)</p> <p>Computer processing of the results of scientific experiments – 2 credits. (second semester)</p> <p>Metrological support of technological processes and production – 2 credits. (third semester)</p> <p>Product quality control technology – 2 credits. (third semester)</p> <p>Computerization of measurement and control. 2 credits. (third semester)</p> <p>Metrological means of control, measurement and diagnostics – 2 credits. (third semester)</p> <p>Standardization and certification – 2 credits. (fourth semester)</p> <p>Economics of metrological assurance – 2 credits. (fourth semester)</p>

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## Analysis of PhD and teacher training programmes

	Overall quality management – 2 credits. (fourth semester) Measurement accuracy theory – 2 credits. (fourth semester)
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	Training graduate students for teaching activities in higher education in accordance with the requirements of national and international standards.
Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	The internships are organized by the education department through mutual agreement with the host organization. During the internship's students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	There are open lectures of industrial workers. Students are engaged in practical work in enterprises. At the final exams, representatives of the quality commission.
What ICT tools are being used in the programme?	Power-point presentation MS office (Excel is applied to perform statistical evaluation and analysis) Projector Electronic board Relevant software programmes.
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students.

### Monitoring of PhD students Programme “Nuclear Physics”

Project EXTEND 586060	TAJK NATIONAL UNIVERSITY
Programme name (profile and area of study of educational programme) NUCLEAR PHYSICS	
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)
The total number of full-time students (statistics over 3 years)	1
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	1
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main items list – 15 credits, (self-study – 9 credits) Teaching methods in high schools – 1,5 credits, (self-study – 1 credits) The science research methodology – 1,5 credits, (self-study – 1 credits)

D1.1 Report on monitoring of RU and TJ practices in teacher training and competence enhancement

## Analysis of PhD and teacher training programmes

	<p>Part of the items to choose from (2 subjects) – 12 credits, (self-study – 8 credits)</p> <p>English – 2 credits.</p> <p>German – 2 credits.</p> <p>French – 2 credits.</p> <p>Computer programmes of mathematical processing – 2 credits.</p> <p>Computer processing of the results of scientific experiments – 2 credits.</p> <p>Specialty subjects – 24 credits, (self-study – 16 credits)</p> <p>Part of the compulsory subjects – 12 credits, (self-study – 8 credits)</p> <p>Experimental methods of nuclear physics – 6 credits, (self-study – 4 credits)</p> <p>Human and environmental radiation safety – 6 credits, (self-study – 4 credits)</p> <p>Part of the items to choose from (4 subjects) – 12 credits, (self-study – 8 credits)</p> <p>Physical basis of nanotechnology – 2 credits.</p> <p>Computer processing of physics – 2 credits.</p> <p>Cosmic rays. 2 credits.</p> <p>High energy physics – 2 credits.</p> <p>Solution of problems in nuclear physics – 2 credits.</p> <p>Nuclear medicine – 2 credits.</p> <p>Forensics of the radio industry – 2 credits.</p> <p>Nuclear reactors – 2 credits.</p> <p>Research work and experiments. 72 credits, (self-study – 60 credits)</p> <p>Doctoral dissertation in the specialty – 45 credits, (self-study – 37 credits)</p> <p>Teaching practice – 9 credits, (self-study – 7 credits)</p> <p>Professional internship (scientific) – 12credits, (self-study – 10 credits)</p> <p>Term attestation</p> <p>Final attestation – 3 credits, (self-study – 2 credits)</p> <p>Final exam – 3 credits, (self-study – 2 credits)</p> <p>Dissertation defense</p> <p>Self-study – 141 credits. Total: – 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods.</p>

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## Analysis of PhD and teacher training programmes

<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Teaching methods in high schools – 1,5 credits. (first semester)  The science research methodology – 1,5 credits. (first semester)  Computer programmes of mathematical processing – 2 credits. (second semester)  Computer processing of the results of scientific experiments – 2 credits. (second semester)  Physical basis of nanotechnology – 2 credits. (third semester)  Computer processing of physics – 2 credits. (third semester)  Cosmic rays. 2 credits. (third semester)  High energy physics – 2 credits. (third semester)  Solution of problems in nuclear physics – 2 credits. (fourth semester)  Nuclear medicine – 2 credits. (fourth semester)  Forensics of the radio industry – 2 credits. (fourth semester)  Nuclear reactors – 2 credits. (fourth semester)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>Training graduate students for teaching activities in higher education in accordance with the requirements of national and international standards.</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>The internships are organized by the education department through mutual agreement with the host organization. During the internship’s students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>There are open lectures of industrial workers. Students are engaged in practical work in enterprises. At the final exams, representatives of the quality commission.</p>
<p>What ICT tools are being used in the programme?</p>	<p>Power-point presentation  MS office (Excel is applied to preform statistical evaluation and analysis  Projector  Electronic board  Relevant software programmes.</p>
<p>Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)</p>	<p>Knowledge of Russian and English languages are mandatory for PhD students.</p>





**D1.1 Report on monitoring of RU and TJ practices in teacher training and competence enhancement**

## Analysis of PhD and teacher training programmes

	<p>Professional internship (scientific) – 12credits (10 credits self-study) Term attestation Final attestation – 3 credits (2credits self-study) Final exam – 3 credits (2 credits self-study) Dissertation defense Total: – 180 credits (141 credits self-study)</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on "postgraduate education" and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Teaching methods in high schools. – 1,5 credits. (first semester) The science research methodology. – 1,5 credits. (first semester) English., German., French. – 2 credits. (first semester) Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits. (first semester) Biotechnology. – 6 credits. (first semester) Research work and experiments. - 6 credits. (first semester) Doctoral dissertation in the specialty. – 3 credits. (first semester) Pharmaceutical Management. – 6 credits (second semester) Mandatory actions for the production of drugs (GMP), Theoretical foundations of pharmaceutical technology. – 2 credits. (second semester) Mathematical modeling in pharmaceutics., Pharmaceutical statistics, – 2 credits. (second semester) Pharmaceutical production validation., Fundamentals of chemical and pharmaceutical production – 2 credits.(second semester) Phyto-drug technology., State policy of the Republic of Tajikistan regarding drugs– 2 credits. (second semester) Teaching practice. – 3 credits (second semester) Research work and experiments. - 3 credits. (second semester) Doctoral dissertation in the specialty. – 6 credits. (second semester) Research work and experiments. - 15 credits. (third semester) Doctoral dissertation in the specialty. – 12 credits. (third semester) Teaching practice. – 3 credits (third semester) Research work and experiments. - 18 credits. (fourth semester) Doctoral dissertation in the specialty. – 6 credits. (fourth semester) Professional internship (scientific) – 6 credits (fourth semester) Research work and experiments. - 21 credits. (fifth semester) Teaching practice. – 3 credits (fifth semester) Professional internship (scientific) – 6 credits (fifth semester)</p>

D1.1 Report on monitoring of RU and TJ practices in teacher training and competence enhancement

## Analysis of PhD and teacher training programmes

	<p>Research work and experiments. – 9 credits. (sixth semester)</p> <p>Doctoral dissertation in the specialty. – 18 credits. (sixth semester)</p> <p>Final exam – 3 credits (sixth semester)</p>
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	Training graduate students for teaching activities in higher education in accordance with the requirements of national and international standards.
Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	The internships are organized by the education department through mutual agreement with the host organization. During the internship's students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	There are open lectures of industrial workers. Students are engaged in practical work in enterprises. At the final exams, representatives of the quality commission.
What ICT tools are being used in the programme?	Power-Point Presentation MS Office (Excel is used for statistical evaluation and analysis of preforms, Access is applied to the database), Interactive whiteboard Relevant software programmes.
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students.

## Monitoring of PhD students Programme “Mathematical and Computer Modelling”

Project EXTEND 586060		TAJIK NATIONAL UNIVERSITY	
Programme name (profile and area of study of educational programme)			
MATHEMATICAL AND COMPUTER MODELING			
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)		
The total number of full-time students (statistics over 3 years)	2		
The total number of part-time students (statistics over 3 years)	0		
How many students are enrolled annually?	2		
Structure of the PhD programme (list of courses, internships and research with credits)			
List of courses, internships and research activities with credit hours	<p>Main items list. – 15 credits. (9 credits self-study)</p> <p>Methods of teaching in high schools – 1,5 credits. (0,5 credits self-study)</p> <p>The science research methodology. – 1,5 credits. (0,5 credits self-study)</p> <p>Part of the items to choose from. – 12 credits. (8 credits self-study) <b>first block:</b> English., German., French. – 2 credits.</p>		

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## Analysis of PhD and teacher training programmes

	<p>Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits.  <b>second block:</b> Computer modelling., optimization models. – 2 credits.          Modeling of rare events, parabolic and evolutionary abstracts., Models of random processes. – 2 credits.          Optimal management theory., scientific and computer graphics – 2 credits.          Modern methods of mathematical calculation., linguistic process and theory of information – 2 credits.          Specialty subjects. – 24 credits. (16 credits self-study)          Mathematical Modeling Systems with divided parameters. – 6 credits. (4 credits self-study)          Model economy. – 6 credits (4 credits self-study)          Part of the items to choose from. – 12 credits. (8 credits self-study)          English., German., French. – 2 credits.          Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits.          Computer modelling., optimization models. – 2 credits.          Modeling of rare events, parabolic and evolutionary abstracts., Models of random processes. – 2 credits.          Optimal management theory., scientific and computer graphics – 2 credits.          Modern methods of mathematical calculation., linguistic process and theory of information – 2 credits.          Research work and experiments. - 72 credits. (60 credits self-study)          Doctoral dissertation in the specialty. – 45 credits. (37 credits self-study)          Teaching practice. – 9 credits (7 credits self-study)          Professional internship (scientific) – 12credits (10 credits self-study)          Term attestation          Final attestation – 3 credits (2credits self-study)          Final exam – 3 credits (2 credits self-study)          Dissertation defense          Total: – 180 credits (141 credits self-study)</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study,</p>	<p>Teaching methods in high schools. – 1,5 credits. (first semester)          The science research methodology. – 1,5 credits. (first semester)          English, German, French. – 2 credits. (first semester)</p>

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## Analysis of PhD and teacher training programmes

<p>% of the total PhD programme workload/credits).</p>	<p>Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits. (first semester)          Mathematical Modeling Systems with divided parameters. – 6 credits. (first semester)          Research work and experiments. - 6 credits. (first semester)          Doctoral dissertation in the specialty. – 3 credits. (first semester)          Model economy. – 6 credits (second semester)          Computer modelling., optimization models. – 2 credits. (second semester)          Modeling of rare events, parabolic and evolutionary abstracts., Models of random processes. – 2 credits. (second semester)          Optimal management theory., scientific and computer graphics – 2 credits. (second semester)          Modern methods of mathematical calculation., linguistic process and theory of information – 2 credits. (second semester)          Teaching practice. – 3 credits (second semester)          Research work and experiments. - 3 credits. (second semester)          Doctoral dissertation in the specialty. – 6 credits. (second semester)          Research work and experiments. - 15 credits. (third semester)          Doctoral dissertation in the specialty. – 12 credits. (third semester)          Teaching practice. – 3 credits (third semester)          Research work and experiments. - 18 credits. (fourth semester)          Doctoral dissertation in the specialty. – 6 credits. (fourth semester)          Professional internship (scientific) – 6 credits (fourth semester)          Research work and experiments. - 21 credits. (fifth semester)          Teaching practice. – 3 credits (fifth semester)          Professional internship (scientific) – 6 credits (fifth semester)          Research work and experiments. – 9 credits. (sixth semester)          Doctoral dissertation in the specialty. – 18 credits. (sixth semester)          Final exam – 3 credits (sixth semester)</p>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>Training graduate students for teaching activities in higher education in accordance with the requirements of national and international standards.</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>The internships are organized by the education department through mutual agreement with the host organization. During the internships students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>There are open lectures of industrial workers. Students are engaged in practical work in enterprises. At the final exams, representatives of the quality commission.</p>
<p>What ICT tools are being used in the programme?</p>	<p>Power-Point Presentation          MS Office (Excel is used for statistical evaluation and analysis of preforms, Access is applied to the database), Math Lab, Mathcad, high level programming languages (C, C++, PHP, JAVA), projector, interactive whiteboard, relevant software programmes.</p>

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## Analysis of PhD and teacher training programmes

Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students.
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### Monitoring of PhD students Programme “Informatics”

Project EXTEND 586060	TAJIK NATIONAL UNIVERSITY	
Programme name (profile and area of study of educational programme) INFORMATICA		
The total number of full-time students (statistics over 3 years)	The total number of part-time students (statistics over 3 years)	
The total number of full-time students (statistics over 3 years)	1	
The total number of part-time students (statistics over 3 years)	0	
How many students are enrolled annually?	1	
Structure of the PhD programme (list of courses, internships and research with credits)		
List of courses, internships and research activities with credit hours	<p>Main items list. – 15 credits. (9 credits self-study)                      Methods of teaching in high schools – 1,5 credits.                      The science research methodology. – 1,5 credits.                      Part of the items to choose from. – 12 credits. (8 credits self-study) <b>first block:</b> English, German, French. – 2 credits.                      Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits. <b>second block:</b> technology for processing operating systems., information systems and public sites. – 2 credits.                      Model economy. Use of Applied Software Applications in Scientific Research. – 2 credits.                      designing applications., data collection technology database– 2 credits.                      use of numerical methods in scientific process., general technology education programmemeing– 2 credits.                      Specialty subjects. – 24 credits. (16 credits self-study)                      mathematical modeling of scientific processes. – 6 credits. (4 credits self-study)                      mathematical modeling of public processes. – 6 credits (4 credits self-study)                      Part of the items to choose from. – 12 credits. (6 credits self-study)                      English., German., French. – 2 credits.                      Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits.                      technology for processing operating systems., information systems and public sites. – 2 credits.                      Model economy., Use of Applied Software Applications in Scientific Research. – 2 credits.                      designing applications., data collection technology database– 2 credits.                      use of numerical methods in scientific process., general technology education programmemeing– 2 credits.                      Research work and experiments. - 72 credits. (60 credits self-study)                      Doctoral dissertation in the specialty. – 45 credits. (37 credits self-study)</p>	

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## Analysis of PhD and teacher training programmes

	<p>Teaching practice. – 9 credits (7 credits self-study)  Professional internship (scientific) – 12 credits (10 credits self-study)  Term attestation  Final attestation – 3 credits (2 credits self-study)  Final exam – 3 credits (2 credits self-study)  Dissertation defense  Total: – 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this a strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities to be being assessed?</p>	<p>Based on the order of the Ministry of Education and Science of the Republic of Tajikistan on “postgraduate education” and the contract between the university and PhD student teaching at the university is mandatory after completion of the programme. However, the learning programme and Syllabus of the student is also assessed and taken in to consideration.</p>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Teaching methods in high schools. – 1,5 credits. (first semester)  The science research methodology. – 1,5 credits. (first semester)  English., German., French. – 2 credits. (first semester)  Computer programmes of mathematical processing (Math Lab, Mathcad), Computer processing of the results of scientific experiments. – 2 credits. (first semester)  mathematical modeling of scientific processes. – 6 credits. (first semester)  Research work and experiments. - 6 credits. (first semester)  Doctoral dissertation in the specialty. – 3 credits. (first semester)  mathematical modeling of public processes. – 6 credits (second semester)  technology for processing operating systems., information systems and public sites. – 2 credits. (second semester)  Model economy., Use of Applied Software Applications in Scientific Research. – 2 credits. (second semester)  designing applications., data collection technology database– 2 credits. (second semester)  use of numerical methods in scientific process, general technology education programming– 2 credits. (second semester)  Teaching practice. – 3 credits (second semester)  Research work and experiments. - 3 credits. (second semester)  Doctoral dissertation in the specialty. – 6 credits. (second semester)  Research work and experiments. - 15 credits. (third semester)  Doctoral dissertation in the specialty. – 12 credits. (third semester)  Teaching practice. – 3 credits (third semester)  Research work and experiments. - 18 credits. (fourth semester)  Doctoral dissertation in the specialty. – 6 credits. (fourth semester)  Professional internship (scientific) – 6 credits (fourth semester)</p>

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## Analysis of PhD and teacher training programmes

	<p>Research work and experiments. - 21 credits. (fifth semester)          Teaching practice. – 3 credits (fifth semester)          Professional internship (scientific) – 6 credits (fifth semester)          Research work and experiments. – 9 credits. (sixth semester)          Doctoral dissertation in the specialty. – 18 credits. (sixth semester)          Final exam – 3 credits (sixth semester)</p>
Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)	Training graduate students for teaching activities in higher education in accordance with the requirements of national and international standards.
Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).	The internships are organized by the education department through mutual agreement with the host organization. During the internship's students conduct experiments in the laboratories and conduct research and development upon the request of the host organization. Usually, the internships provide opportunity to write and publish articles.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	There are open lectures of industrial workers. Students are engaged in practical work in enterprises. At the final exams, representatives of the quality commission.
What ICT tools are being used in the programme?	<p>Power-Point Presentation          MS Office (Excel is used for statistical evaluation and analysis of preforms, Access is applied to the database), Math Lab, Mathcad, high level programming languages (C, C++, PHP, JAVA)          projector          Interactive whiteboard          Relevant software programmes.</p>
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	Knowledge of Russian and English languages are mandatory for PhD students.



**D1.1 Report on monitoring of RU and TJ practices in teacher training and competence enhancement**

## Analysis of PhD and teacher training programmes

### Appendix 8 – Outcome 1.1 KSU, Khujand, Tajikistan

In this Appendix it is possible to find the whole set of Outcomes 1.1. done by Khujand State University, Khujand, Tajikistan. The monitoring of University’s practices in PhD students’ and teacher’s training and competence enhancement (with focus on teaching engineering disciplines). This set of cases is not a whole set of best practices for the referred universities, but as a perspective constructed by the experts of the EXTEND project.

#### Monitoring of PhD students Programme “Physics and Technics”

Project EXTEND 586060	Khujand State University named after academician Bobojon Gafurov
Physics and Technics	
The total number of full-time students (statistics over 3 years)	Total 10245 (79 PHD: 1 <sup>st</sup> year 34 student, 2 <sup>nd</sup> year 29 students and 3 <sup>rd</sup> year 16 students)
The total number of part-time students (statistics over 3 years)	10420 (no applicable)
How many students are enrolled annually?	Above 4500 (50 PHD students)
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	Main Subjects Mandatory 1. Methods of teaching in High Schools - (1.5 credits) 2. Research methodology of scientific research (1.5 credits) 3. Macroeconomics (6 credits) 4. Dynamic application (6 credits) 5. Programmeming application with objects (6 credits) 6. Data Processing and Data Processing Devices-(6 credits) 7. Physical Condensation Physics (6 credits) 8. Electro-physics properties of solid (6 credits) 9. Classical orthogonal System (6 credits) 10. Structural theory of constructions (6 credits) 11. Information on domestic and international trade information systems (1.5 credits) 12. Assistance of macroeconomic processes (6 credits) Main subjects 15 credits Elective Subjects (24 credits. Subjects are changeable) For all subjects there is a mandatory Research methodology of scientific research (72 credits) Writing PHD dissertation (45 credits) Pedagogical and professional Practice (21 credits) - Pedagogical practice - 9 credits - Professional practice -12 credits Final exam 3 credits

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## Analysis of PhD and teacher training programmes

	<p>Dissertation defense</p> <p>Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The result of education is according to the university's PHD requirements Young teachers of the university are recruited mostly from the gradutors of the Master degree programmes. And the methods apply to all specialists of the university.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<ul style="list-style-type: none"> <li>• Based on basic knowledge and skills performed during the study</li> <li>• Grades obtained during the Bachelor, MA and PhD.</li> <li>• Based on the supervisor recommendation</li> <li>• State Attestation Decision and suggestion</li> </ul>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<p>Education Methods in higher education institutes (1.5 credits first semester)</p> <ol style="list-style-type: none"> <li>1. Methods of teaching in High Schools - (1.5 credits)</li> <li>2. Research methodology of scientific research (1.5 credits)</li> <li>3. Macroeconomics (6 credits)</li> <li>4. Dynamic application (6 credits)</li> <li>5. Programmemeing application with objects (6 credits)</li> <li>6. Data Processing and Data Processing Devices-(6 credits)</li> <li>7. Physical Condensation Physics (6 credits)</li> <li>8. Electro-physics properties of solid (6 credits)</li> <li>9. Classical orthogonal System (6 credits)</li> <li>10. Structural theory of constructions (6 credits)</li> <li>11. Information on domestic and international trade information systems (1.5 credits)</li> <li>12. Assistance of macroeconomic processes (6 credits)</li> </ol>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>The contents of the course to be taught in PhD includes relevant themes for methods of teaching in higher education. Modern methods of teaching using mew technologies and teaching which runs by computer programme applications is as well other teaching tool in this level of study. But mostly they work with their supervisor and individually.</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities students perform during internship, how it is assessed, who is in charge of organization).</p>	<p>The internships are organized by the concern chair at the university. The chair may give some hours if needed and the students may be requested by the supervisor to teach.</p>
<p>If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)</p>	<p>While providing the experiments the students visit the industry and provide their experiments their</p>
<p>What ICT tools are being used in the programme?</p>	<p>All teachers and PhD students widely use ICT which is not limited but includes: Power-point presentation, Ms office, Electronic board, Virtual laboratory</p>

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## Analysis of PhD and teacher training programmes

Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	In their curricula, the international element is not shown as a mandatory but it can be negotiated. Fortunately, PhD students participate at the conferences, workshops and other activities which is carried out across the border. Publish their articles and communicate with relevant staff at foreign countries' universities.
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### Monitoring of PhD students Programme "Mathematics"

Project EXTEND 586060	Khujand State University named after academician Bobojon Gafurov
"Mathematics"	
The total number of full-time students (statistics over 3 years)	17
The total number of part-time students (statistics over 3 years)	0
How many students are enrolled annually?	5
Structure of the PhD programme (list of courses, internships and research with credits)	
List of courses, internships and research activities with credit hours	<p>Main Subjects</p> <p>Mandatory</p> <ol style="list-style-type: none"> <li>1. Education Methods in higher education institutions (1.5 credits)</li> <li>2. Research Methods (1.5 credits)</li> </ol> <p>Elective Subjects (12 credits)</p> <ol style="list-style-type: none"> <li>1. English (6 credits)</li> <li>2. Software for Mathematical Processing (Mathlab, MathCad) (3 credits)</li> <li>3. Computer based processing of Scientific analyzes (3 credits)</li> </ol> <p>Specialization <u>subjects</u></p> <p>Mandatory (12 credits)</p> <p>Real Analyzing (6 credits)</p> <p>Complex Analyzing (6 credits)</p> <p>Elective subjects (12 credits)</p> <ol style="list-style-type: none"> <li>1. Functional Analyzing (1.5 credits)</li> <li>2. The side problems of the theory of functional and general analytics (1.5 credits)</li> <li>3. The differential equations (1.5 credits)</li> <li>4. The special integral equations (1.5 credits)</li> <li>5. Theory and Methods of teaching Mathematics (1.5 credits)</li> <li>6. Efficacy of teaching process (1.5 credits)</li> <li>7. The elements of stereometry (1.5 credits)</li> <li>8. The elements of trigonometry (1.5 credits)</li> </ol> <p>Research and laboratory work 72 credits</p> <p>Writing the dissertation (45 credits)</p> <p>Pedagogy and professional internships (21credits)</p> <p>Pedagogy internship (9 credits)</p> <p>Professional internship (scientific) 12credits</p>

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## Analysis of PhD and teacher training programmes

	<p>Term attestation Final attestation 3 credits Final exam 3 credits Dissertation defense Total: 180 credits</p>
<p>If there are learning outcomes in the PhD programme connected with the teaching activity? If yes, please list the learning outcomes in the field of teaching activity if they are concerned to the specified PhD programme.</p>	<p>The PhD students enhance their knowledge and expertise in Specialization subjects so this is strength of the PhD courses. In addition, during the courses they have the possibility of attending various seminars and laboratory activities which enriches their knowledge and understanding. Moreover, the courses improve monitoring and analytical skills of the PhD students so they will be able to become professional supervisors and lead students research and independent works as they have a strong knowledge in research methods and experimental design.</p>
<p>How do you measure readiness of PhD students/PhD graduates to work as a university teacher? List and give short description of how learning outcomes connected to teaching activities are being assessed?</p>	<ul style="list-style-type: none"> <li>• Based on basic knowledge and skills performed during the study</li> <li>• Grades obtained during the Bachelor, MA and PhD.</li> <li>• Based on the supervisor recommendation</li> <li>• State Attestation Decision and suggestion</li> </ul>
<p>List the courses and other activities which are dedicated (at least partially) to prepare PhD student for teaching. Give credits, show the place of these courses in the structure of the programme (year of study, % of the total PhD programme workload/credits).</p>	<ol style="list-style-type: none"> <li>1. Education Methods in higher education institutions (1.5 credits)</li> <li>2. Research Methods (1.5 credits)</li> <li>3. Software for Mathematical Processing (Mathlab, MathCad) (3 or 6 credits)</li> <li>4. Computer based processing of Scientific analyzes (3or 6 credits)</li> <li>5. Real Analyzing (6 credits)</li> <li>6. Complex Analyzing (6 credits)</li> <li>7. Functional Analyzing (1.5 credits)</li> <li>8. The side problems of the theory of functional and general analytics (1.5 credits)</li> <li>9. The differential equations (1.5 credits)</li> <li>10. The special integral equations (1.5 credits)</li> <li>11. Theory and Methods of teaching Mathematics (1.5 credits)</li> <li>12. Efficacy of teaching process (1.5 credits)</li> <li>13. The elements of stereometry (1.5 credits)</li> <li>14. The elements of trigonometry (1.5 credits)</li> <li>15. Pedagogy internship (9 credits)</li> <li>16. Professional internship (12credits)</li> </ol>
<p>Describe briefly contents of the course/courses dedicated to teaching activity of PhD student (title of modules/topics, description of teaching tools and approaches are being taught to students)</p>	<p>The contents of the course to be taught in PhD includes relevant themes for methods of teaching in higher education. Modern methods of teaching using mew technologies and teaching which runs by computer programme applications is as well other teaching tool in this level of study. But mostly they work with their supervisor and individually.</p>
<p>Describe how teaching internship is organized for PhD students (what type of activities</p>	<p>The internships are organized by the education department and Science departments at home Institution or through mutual agreement with the host organization. During the internships</p>

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## Analysis of PhD and teacher training programmes

students perform during internship, how it is assessed, who is in charge of organization).	students conduct experiments in the laboratories and conduct research and development upon the request of the host organization.
If there is any connection with industry (examples could be participation of industry experts in examination, accreditation practices, guest lectures?)	While providing the experiments the students visit the industry and provide their experiments their papers. We invite from industry as a guest lecture and there will be communication between them. In bachelor and master degree programmes there is a compulsory component to visit industry during 2 months to utilize gained knowledge into practice.
What ICT tools are being used in the programme?	Since 2009, the government pays a very special attention to equipping classrooms and technologizing it with the modern equipment. Master classes and workshops have been conducted to teachers to use effectively all the equipment during their lessons. The use of the: Power Point, Ms office, MathLab, MathCad, Projector, Electronic board and other applications have become an important part of the teaching.
Is there any international element in the programme? (mobility, conferences, languages, guest lectures?)	According to the curriculum it is not as a compulsory element of the PhD, however as the second language in the country in Russian and English language is the international language they will have enough hours to master English and Russian in the necessary level to enable themselves to participate at the conferences and publish their outcomes.