Final Report

on external evaluation of

the cluster of educational programmes:

"Electronics and Nanoelectronics" (11.03.04, 11.04.04),
"Electronics, Radio Engineering and Communication Systems" (11.06.01),

delivered by the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod"

Nizhny Novgorod, 2020

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Chair of the External Review Panel Erich Gornik

Nizhny Novgorod, 2020

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Introduction

The external evaluation of the cluster of educational programmes in "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication Systems" (11.06.01), delivered by the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod" (hereinafter - UNN), took place on December 10 – 12, 2019 and included the analysis of the Self Evaluation Report, a site visit to UNN and preparation of the Final Report.

The goal of the external evaluation is to establish the level of compliance of the cluster of degree programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication Systems" (11.06.01), delivered by the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod", with the standards and criteria of international public accreditation developed by the National Center for Public Accreditation (NCPA) and with the European standards and guidelines (ESG) for quality assurance in higher education (ENQA).

The Final Report on the outcomes of the external evaluation is the basis for decision making by the National Accreditation Board on professional public accreditation of the study programmes in compliance with the standards and criteria of NCPA.

1. CONTEXT AND MAIN STAGES OF THE EXTERNAL EVALUATION

1.1 Terms of Reference

According to item 1, 3 article 96 of the Federal Law of the Russian Federation of December 29, 2012 No.273-FZ "On education in the Russian Federation" organizations, which implement educational activities, may apply for public accreditation in various national, foreign and international institutions; employers, employer associations and designated organizations have the right to conduct public accreditation of professional educational programmes, which are delivered by an educational institution.

In order to obtain professional public accreditation of the cluster of study programmes in "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication Systems" (11.06.01) UNN applied to NCPA, which carries out its activity at the national level and is recognized by the leading international organizations of quality assurance in higher education.

1.2 External Review Panel

The international experts were nominated by a foreign quality assurance agency upon NCPA's request.

The professional community expert was nominated by the Institute for Physics of Microstructures of the Russian Academy of Science, the Affiliation of

the Federal State Budgetary Research Institution "Institute of Applied Physics of the Russian Academy of Science".

The representative of the students' community was suggested by the executive staff of Nizhny Novgorod State University of Architecture and Civil Engineering.

The composition of the External Review Panel was approved by NCPA.

The Review Panel included five international and national experts:

- **Erich Gornik** - D.Sc., Emeritus Professor, Technical University of Vienna, President of the Austrian Society for Nano- and Microelectronics (1994-2004), President of the Society "Forschung Austria" (2004 - 2008), President of the Austrian Physical Society (2009 – 2012) — foreign expert, Review Chair;
- **Sergei Letuta** - Doctor of Physical and Mathematical Sciences, Professor, Director of the Common Use Centre of Instrumentation Equipment «Institute of Micro- and Nanotechnology», Orenburg State University, member of the Guild of Experts in Higher Education — Russian expert, Deputy Review Chair;
- **Silke Christiansen** - Dr., Professor, Institute of Experimental Physics at Free University of Berlin, Director of the Institute of Nano-Architectures for Energy Conversion at the Helmholtz Center for Materials and Energy, Distinguished Visiting Professor of Chonbuk National University (South Korea), expert in nanostructures — foreign expert, Panel member;
- **Vladimir Gavrilenko** - Doctor of Physical and Mathematical Sciences, Professor, Deputy Director for Research, Head of the Department of Physics of Semiconductors, Institute for Physics of Microstructures, Russian Academy of Sciences – branch of the Institute of Applied Physics of the Russian Academy of Sciences — representative of professional community, Panel member;
- **Olga Spesivtceva** - 6th year student, Nizhny Novgorod State University of Architecture and Civil Engineering — representative of students, Panel member.

The focused expert knowledge of the Panel members, long-term experience of working in the system of higher education and profession, active position of students and employers became the basis for effective consideration of issues in the process of evaluation.

The participation of the Russian representatives of the higher education system gave an opportunity to analyze the activity of the programmes under evaluation in the context of the world trends in quality assurance and within the scope of the national educational.

1.3 Goals and objectives of the review

The purpose of public accreditation is to improve the quality of education and form quality culture in educational institutions, discovering best practices in continuous enhancing the educational quality and public information on educational institutions in accordance with the European educational quality standards.

The main goal of the peer review is to determine the correspondence of the reviewed study programmes in "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication

Systems" (11.06.01), delivered by the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod", to the standards and criteria of public accreditation, which are developed by NCPA in compliance with the European Standards of Quality Assurance in Education (ESG-ENQA); and to develop recommendations for the study programmes with the purpose of improving the contents and structure of the educational process.

1.4 Stages of the review

The review included three main stages:

1.4.1 Study of the Self-Evaluation report

The Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod" was responsible for conducting the self-evaluation procedure, developing and timely submitting the Self–Evaluation Report of the cluster of educational programmes in "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication Systems" (11.06.01).

According to the *Guidelines on Self-evaluation of Educational Programmes*, which were developed by NCPA, The Self-Evaluation Report is written on 72 pages and includes: introduction, findings, conclusions, and annexes. The self-evaluation procedure was conducted on the basis of SWOT analysis according to every standard of NCPA.

According to the review schedule, the Self-Evaluation report of the study programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01) was submitted to NCPA and mailed to the members of the review panel 30 days before the site-visit.

While studying the Self-Evaluation Report the panel members formed a preliminary opinion about the reviewed educational programmes on compliance with the standards of NCPA and criteria on accreditation and with the European standards of education quality.

The members of the review panel assessed the quality of preparation of the Self-Evaluation Report with regards to its text structuring, compliance of information with the Report's sections; quality of perception; sufficiency of analytical data; availability of references to supporting documents; completeness of information. All of these made it possible for the members of the Review Panel to formulate a preliminary opinion. The Report includes the objective opinion on strengths and weaknesses of the educational programmes in the context of compliance with every NCPA's standard and criterion.

The review panel pointed some weaknesses of the Self-Evaluation Report: some items of the Report have references to Annexes (for example, Annex 4.3.3, Annex 4.5.1., etc.). However, the mentioned Annexes are not available.

The review panel made the following conclusions on the outcomes of the preliminary analysis:

1. The cluster of educational programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01), delivered by UNN, complies with NCPA's standards and criteria and European standards of educational quality.

2. The self-evaluation process determined main directions for improvement of every standard. The Report provides a detailed action plan, which assures full compliance of the educational programmes with the accreditation criteria and the education quality standards.

According to the standards and criteria of accreditation of NCPA, the preliminary assessment of the study programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01) may be defined as **full compliance.**

The following issues need to be analyzed in detail:

1. Stages of implementation of quality assurance policy at the University level.

2. Students' participation in the monitoring of the achievement of the standards' criteria.

3. Revision of the programmes' study plans and preparation of graduation theses upon official requests of employers.

4. Participation of employers, professional communities and other organizations in designing professional standards for the demanded trends of electronics, nanoelectronics and microsystems engineering.

5. Specific nature of educational paths of Master students having part-time jobs.

6. Possibility of increasing the number of foreign students at the Faculty of Physics for Study Programme 11.00.00 "Electronics and Nanoelectronics".

7. International externships of the teaching staff (organization, budgeting).

8. Academic mobility of students (organization, budgeting, agreeing the study plans).

9. Finance system of the educational programmes.

10. The teachers' contentment with working conditions and the students' contentment with the quality of academic process and education.

11. Efficiency of employment system for the graduates.

12. Completeness and sufficiency of information on the study programmes for special needs persons and foreign students.

13. Regulations and frequency of evaluation and revision of the study programmes. Participation of stakeholders.

14. E-courses of educational programme 11.00.00 "Electronics and Nanoelectronics".

During the preliminary meeting the members of ERP came up with suggestions which determined the main strategy of the site visit.

1.4.2 Site visit to UNN

The review panel visited UNN on December 10-12, 2019 with the purpose of confirming the authenticity of the information, which was presented in the Self-Evaluation Report, collecting additional information on the implementation of the programmes under accreditation and checking their compliance with the standards and criteria of NCPA and European Standards and Guidelines for quality assurance.

The time line and the agenda of the site-visit were determined by NCPA and approved by the administration of the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod" and the members of the Review Panel.

During the site-visit the Review Panel members conducted a number of meetings and interviews

1. General meeting of the Review Panel with the University administration and people responsible for accreditation: acting Rector of the University K.A. Markov, research advisor E.V. Chuprunov, Vice-Rector for Academic Affairs O.V. Petrova, Vice -Rector for Public Relations N.V. Avralev, Vice -Rector for Foreign Affairs A.B. Bedniy, Vice-Rector for Social Work and Cooperation with Employers T.N. Bespalova, Director of the Institute of Doctoral and Postgraduate Programmes B.I. Bedniy, Head of the Academic and Methodological Office E.V. Gugina, Head of the Personnel Office N.N. Bureeva, Dean of the Faculty of Physics A.I. Malyshev, Head of the Centre of Educational Quality I.I. Borisova.

2. Meeting with the Dean of the Faculty of Physics and his deputies: Dean of the Faculty of Physics A.I. Malyshev, Deputy-Dean O.V. Belova, associate-professor E.V. Zaitceva.

3. Meeting with the Head of the Department of Physics of Semiconductors, Electronics and Nanoelectronics D.A. Pavlov and associate-professor S.M. Plankina.

4. Meeting with graduates: Gryaznova Maria (Federal State Unitary Enterprise Sedakov Research Institute of Measuring Systems), Arkhipova Ekaterina (Institute Of Microstructure Physics of the Russian Academy of Science), Boyarkov Aleksey (Federal State Unitary Enterprise Sedakov Research Institute of Measuring Systems), Korotkova Maria (Research and Production Enterprise “Salut”).

5. Meeting with the teaching staff: Professors E.S. Demidov and A.A. Ezhevskiy, associate-professors A.P. Gorshkov, A.V. Errshov and others.

6. Meeting with the students of 1st and 2nd year of Master programmes, 1st, 2nd, 3rd, 4th year of Bachelor programmes (15 participants).

7. Meeting with postgraduate and Doctoral programme students (8 postgraduates).

8. Meeting with representatives of professional community: representatives of the Federal State Unitary Enterprise Sedakov Research Institute of Measuring Systems, Research and Production Enterprise “Salut” and Institute Of Microstructure Physics of the Russian Academy of Science.

The Chair of the Review Panel managed the Panel’s work.

The Panel considers that the Self-Evaluation Report, which was presented by UNN, provided the experts with an opportunity to form an integral view on specific features of implementation of the reviewed study programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01).

The reviewed documents and the interviewed persons, visits to study rooms, laboratories, library resources provided the Review Panel members with sufficient information about the study programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01), delivered by UNN.

The Review Panel considers it necessary to emphasize the effective cooperation of the experts and NCPA employees during the site-visit and its preparation.

The Review Panel notes the highest level of organizational provision and constructive work.

The executive staff of UNN provided the administrative support, which included arrangement of meetings and interviews, provision with working space, computers with access to the Internet, necessary research, academic and methodological documents.

During the site-visit to UNN the Review Panel members requested additional documents. The Panel reviewed the curricula, information on the teaching staff, and the syllabi of academic disciplines.

On the last day of the site-visit the Chair of the Review Panel presented an oral report on the general conclusions to the administrative staff of the University, Heads of the Institutes and Departments, teachers and students.

The agenda of the site-visit can be found in the Annex.

1.4.3 Conclusion on the findings of the external review

Based on the results of the external review of the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod" the Review Panel submitted the Report on the results of the external review of the study programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01), delivered by the University.

The draft report of 28 pages excluding Annexes was developed by the Chair of the Review Panel, approved by the other Review panel members and submitted to the National Centre for Public Accreditation. Then the Report will be mailed to the University's administration for the correction of factual errors.

2. DESCRIPTION OF THE STUDY PROGRAMMES

Educational programmes "Electronics and Nanoelectronics" (11.04.04), "Electronics, Radio Engineering and Communication Systems" (11.06.01) are implemented at the Department of Physics of Semiconductors, Electronics and Nanoelectronics of the Faculty of Physics of the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod".

The Head of the basic Department of Physics of Semiconductors, Electronics and Nanoelectronics - Doctor of Physical and Mathematical Sciences Pavlov Dmitriy Alekseevich.

The Dean of the Faculty of Physics - Doctor of Physical and Mathematical Sciences Pavlov, associate professor Malyshev Aleksander Igorevich.

Enrollment in the study programmes:

	2016	2017	2018	2019
Bachelor programmes	58	56	50	61
Master programmes	16	20	16	27
Postgraduate programmes	14	9	11	8

The educational programmes are implemented according to the development programme of the University. Regional employers, academic industrial Institutes take an active part in implementing and improving the educational programmes.

Active cooperation with employers in forming the internship opportunities, developing pools of evaluation means provides the possibility to

carry out quality training. Employers participate in reviewing syllabi of the academic disciplines, pools of evaluation tools and educational programmes with the purpose of accounting for the requirements of professional standards. Designing and implementing of the internal educational standards, availability of clearly defined, documented, approved and published goals of educational programmes, expected learning outcomes and their compliance with the mission, goals and objectives of the educational institution, procedures of designing, approving and revising the programmes promote the competitive growth of the academic programmes.

The personal growth and development of students in the process of studying are provided by the availability of the effective system of encouragement and support of academic progress and research activity.

The system of career-guidance work with applicants – school-leavers of Nizhny Novgorod and Nizhny Novgorod region is implemented by the Faculty of Physics. There are also international students who study at the educational programmes. The opportunity of recognition of academic disciplines, which are studied in partner HEIs, is available.

The University has a unified informational network and electronic educational environment.

A highly qualified teaching staff provides designing and implementing the academic programmes. Specialties, scientific degrees and titles, the experience of practical work of the teachers comply with the focus of the study programmes. The publishing activity and scientometrical indexes of the Faculty's teaching staff indicate the high qualification and research level.

The Faculty's and the programmes' graduates are demanded by regional employers.

3. FINDINGS

3.1 Standard 1. Policy (goals, objectives, development strategy) and procedures of quality assurance

Compliance with the standard: ***Full compliance***

Table 1 - Criteria for Standard 1

№	Subject of Evaluation	Mark
1.	Availability of a documented inner quality assurance system providing continuous enhancement of quality in accordance with the developmental strategy of the educational institution	A
2.	Participation of all stakeholders (administration, teaching staff, students, employers, employer associations, branch ministries and departments – key partners in employment of graduates) in developing and implementing a quality assurance policy through relevant structures and processes	A
3.	Participation of all structural units of an educational institution in quality assurance processes and procedures	A

Analysis of the cluster of educational programmes' compliance with the standard:

UNN clearly determined the mission of the University and missions of every educational programme, which includes the mission of the programme cluster "Electronics and Nanoelectronics". The University has developed the system and established the structural units for quality assurance, particularly the Centre of Quality Assurance. The HEI has developed the procedures of internal quality management and conducts regular monitoring of the academic process and progress.

The real connection of research works with academic activity assures continuous quality improvement. The results of research work are actively implemented in the academic process, syllabi, methodological publications in order to keep them current with the developments of science and technology.

Taking account of the employers' viewpoints and opinions is an important condition for acknowledgement of the quality of education and training.

Achievements:

The key-achievement in the quality assurance policy of the educational programme is the right to design own educational standards, which guarantee UNN's involvement in the processes of innovational development of the region. The standards are designed by the administration and academic staff with the participation of students, employers and the University's partners, which provides the involvement of all the stakeholders in implementing the quality assurance policy.

The University's Academic and Methodological Office and the Centre of Quality Assurance provide the participation of all the HEI's units in timely implementation of the required procedures, which guarantee the stability of quality assurance of academic programmes. The procedures of decision making and programme management assure their high professional level. The analysis of the curricula testifies to their up-to-dateness.

The participation of employers and partners in designing the standards guarantees a wide choice of internships in Nizhny Novgorod region and beyond, which encourages all the stakeholders to take part in implementing the quality assurance policy and provides the University with high ranking in national and international top lists.

Recommendations:

It is recommended to develop a detailed road map for the implementation of the quality assurance policy.

It is advisable to improve the participation of students and employers in the evaluation of the programmes under accreditation and the development of requirements for forming graduates' competencies.

It is recommended to reduce numerous bureaucratic procedures, which slow the implementation of the programmes.

It is advisable to conduct regular monitoring of the criteria achievement, which could assure the high quality of the programme implementation.

3.2 Standard 2. Design and approval of programmes

Compliance with the standard: ***Full compliance***

Table 2 – Criteria to Standard 2

№	Subject of Evaluation	Mark
1.	Availability and accessibility of clearly defined, documented, approved and published goals and objectives of a study programme and expected learning outcomes and their correspondence to the mission and goals and objectives of the educational institution	A
2.	Availability of procedures for design, approval and revision of a study programme (including expected learning outcomes) with the account of the development of science and industry, and also with the consideration of stakeholder opinions (administration, teaching staff, students, employers)	A
3.	Consideration of the requirements of professional standards (if available), of labour market, of national qualification framework descriptors in the study programme	A

Analysis of the cluster of educational programmes' compliance with the standard:

Every educational programme of cluster 11.03.04 "Electronics and Nanoelectronics" (Bachelor programmes), 11.04.04 "Electronics and Nanoelectronics" (Master programmes) has goals, objectives and expected learning outcomes, which are developed on the basis of the qualification requirements for the training level of the UNN's Educational Standard. The documents are available on the University's official web-site in the section "Academic Programmes". The specific feature of the programme cluster "Electronics and Nanoelectronics" is the preservation of fundamental classical education and training. The methods of the goal achievement are designed and specified in the HEI's local regulations.

The local regulations are developed by the Legal Office. The Office regulates the implementation of the University's academic process. The Legal Office developed and approved the Regulations for the order of designing and approving educational programmes, determined conditions and technologies

for implementation of the academic process, evaluation of the programme graduates' quality.

The students' opinions on the programmes' quality is taken into account through cooperation with the Student Councils of the University and the Faculty of Physics.

The Regulations for the order of designing and approving educational programmes determine the statutory reviewing and agreeing the educational programmes with employers. The process of designing curricula, syllabi and the programmes of work placement and internships involves taking into account the requirements of professional communities for inclusion disciplines and their implementation within the framework of the academic process, organization of all kinds of internships, conducting the State Final Attestation.

The professional competencies of the educational programmes are formed on the basis of professional standards, which correspond to the graduates' professional activity, analysis of the requirements for professional competencies, which are claimed by the labor market, specification of best national and international practices, consultation with the leading employers of the economic sector.

Achievements:

The educational programmes have clearly determined goals, objectives and expected outcomes. The procedures of development and approval of the programmes are specified. The Faculty of Physics regularly develops and implements new requirements for the expected learning outcomes.

The goals and objectives of the educational programmes comply with the HEI's missions, goals and tasks.

The procedures of management and decision making assure the high professional level of the programmes.

The University has a wide choice of internships in Nizhny Novgorod region, other Russian cities and abroad.

Recommendations:

It is recommended to grant the administration of the programmes more freedom in making decisions in strategic and financial issues. There are too many bureaucratic procedures.

It is advisable to specify the procedures of cooperation with employers related to regular agreeing the syllabi of special courses of the Master programmes.

It is recommended to involve international teachers and researchers into the process of designing programmes for the purpose of promoting the compliance of the educational programmes with international standards.

It is advisable to improve the involvement of professional communities in developing professional standards.

3.3 Standard 3. Student-centered learning, teaching and assessment

Compliance with the standard: ***Full compliance***

Table 3 – Criteria to Standard 3

№	Subject of Evaluation	Mark
1.	Consideration of needs of diverse groups of students and a possibility to create individual learning paths	A
2.	Use of methods encouraging students to take an active part in creating the learning process	B
3.	Use of clearly defined criteria and objective assessment procedures of learning outcomes/ competences of students corresponding to the expected learning outcomes, goals of the study programme and their purpose (diagnostic, formative or summative assessment)	A
4.	Information about the study programme, criteria and procedures for assessment of learning outcomes/competencies, about examinations, tests and other types of control.	A
5.	Use of procedures of independent assessment of learning outcomes	A
6.	Availability and effectiveness of appeals procedure and procedures for dealing with students complaints	A

Analysis of the cluster of educational programmes' compliance with the standard:

The students have the opportunity of choosing educational paths. The University applicants are offered two educational paths. The Bachelor programme students may choose the programme "Electronics and Nanoelectronics" (11.03.04) with the profile "Solid-State Electronics and Nanoelectronics" or the programme "Nanotechnologies and Microsystem Engineering" (28.03.01) with the profile "Materials of Micro- and Nano-System Engineering". These Bachelor programmes have their own educational standards. There are 3 Postgraduate programmes: "Solid-State Electronics, Radioelectronic Components, Micro- and Nano-Electronics, Devices on Quantum Effects" (05.27.01); "Semiconductor Physics" (01.04.10); 01.04.07 – "Condensed State Physics". The University implements student-centered learning, uses encouragement methods for prompting active participation in designing the academic process for every student of the cluster "Electronics and Nanoelectronics".

With the purpose of taking into account the demands of different student groups UNN created the committee for consideration of the issues of an individual training schedule. Special conditions are available for special needs students of the cluster.

The Faculty of Physics takes an active part in the procedures of internal quality assurance and encouragement of students in the cooperative development of the educational process. The University conducts a weekly seminar, which is held for research advisors, Postgraduate, Master and Bachelor students.

The implementation of evaluation procedures requires the use of evaluation methods for academic progress and achievements according to the local regulations. The students are informed about the educational programmes, criteria and procedures for the assessment of learning outcomes

/ competencies, examinations, tests and other types of control through the University's and the Faculty's web-sites.

"Regulations on conducting State Final Attestation in educational programmes of higher education – Bachelor, Specialist, Master programmes – in UNN" (order 279-ОД of 08.06.2017, item 5) officially determines the appeal procedure.

Achievements:

The students are satisfied with the programmes' content and learning conditions in UNN. Different groups of students have the possibility to participate in the improvement of the educational programmes and design of individual educational paths.

Resident, off-campus and special needs students' requirements are provided for in implementing the programmes.

The curricula and syllabi are structured and guarantee the high level of fundamental training in physics, electronics and nano-technologies.

The criteria and procedures of evaluation of the expected learning outcomes are developed, approved and clear for the students. The University conducts independent evaluation of the expected learning outcomes.

Recommendation:

In order to improve the effectiveness of creating individual training paths it is recommended to provide the students with more time for working in laboratories of the base organizations – key employment partners.

The University is fitted with modern expensive equipment, which provides the opportunity of conducting research and writing Masters' theses at a very high level. However, some laboratory equipment needs modernization and renewal (for example, laboratories of general physics).

It is advisable to improve the system of inclusive education.

3.4 Standard 4. Student admission, support of academic achievements and graduation

Compliance with the standard: ***Full compliance***

Table 4 - Criteria to Standard 4

№	Subject of Evaluation	Mark
1.	Systematic carrier guidance work targeted at the recruiting and selection of applicants should be in place	A
2.	Availability and effectiveness of rules and regulations for admission, transfer of students from other educational institutions, recognition of qualifications, periods of study and prior learning	A
3.	Systematic work to support students' progression	A
4.	Recognition of higher education qualifications obtained in the RF and abroad (Diploma Supplement)	A
5.	Participation of students in mobility programmes	B

Analysis of the educational programmes' compliance with the standard:

The University performs career guidance work systematically and in a controlled manner. The Faculty of Physics maintains contacts with educational

institutions of secondary education of Nizhny Novgorod and Nizhny Novgorod region, schools of the University cluster, gymnasiums, lyceums, the Centre of Gifted Children. The Faculty conducts open-door days, city conferences of Scientific Society, organization of 10-12 sections under the aegis of the Faculty's teachers, interregional Olympiads for schoolchildren "Future researchers – the future of science", which are included in the list of olympiads that provide benefits in admission to HEIs of the Russian Education. UNN regularly holds cultural and educational events: exhibitions, workshops, lectures conducted by invited lecturers, theme-based excursions for visitors of all ages, specifically for schoolchildren. The Faculty houses the School of Physics and Mathematics for schoolchildren of the 10-11th forms.

The rules of admission to the Faculty of Physics, the time-limits of all the necessary procedures and the list of documents, contacts, the time-table of admission tests, the number of the state-funded places, the cost of commercial training of the cluster "Electronics and Nanoelectronics" are available on the page of the Faculty of Physics of the University's official web-site. The e-reception office is available for interactive communication with applicants.

The procedures of transition of students from other educational institutions, recognition of previous periods of education and training, acquired credits and qualifications are available for all the stakeholders.

The monitoring of the students' academic progress is conducted by the Dean's office and the Scholarship Department. UNN implemented informational system "Galaktika. HEI management system", which provides the opportunity to draw necessary materials and information through the module "Academic progress".

Achievements:

The career guidance work is effective and systematic, which is proved by the annual growth of the passing score for applicants of the programme "Electronics and Nanoelectronics".

The rules and procedures of admission, transition of students from other educational institutions, recognition of previous training, acquired credits and qualifications are available for all the stakeholders.

The University developed a system of promoting academic progress and publishing activity.

UNN issues the Diploma Supplement according to the model, which is developed by the European Commission, the Council of Europe and UNESCO/CEPES. The Diploma Supplement is issued by the University's Centre of Quality Assurance.

Recommendations:

It is recommended to increase the number of students, who take internships and training courses in foreign HEIs and scientific courses. It is advisable to improve the procedures of mutual recognition for those, who take foreign internships and academic courses.

It is recommended to improve the system of student support and extend students' participation in international conferences.

It is advisable to provide additional courses of the English language for the students with a focus on understanding special technical texts and documents.

3.5 Standard 5. Teaching staff

Compliance with the standard: ***Full compliance***

Table 5 - Criteria to Standard 5

№	Subject of Evaluation	Mark
1.	Qualification and competence of the teaching staff : – Academic degrees and titles; – Industry and state awards and prizes; – Practical experience; – Published text books, handbooks and methodological guidebooks	A
2.	Relevance of specialists, degrees and titles and /or practical experience to the profile of the study programme	A
3.	Research activity of the teaching staff, implementation of research results in the academic process	A
4.	Use of innovative teaching methods and advanced technologies	A
5.	Visiting lecturers from other educational institutions including those from abroad	B
6.	Participation of the teachers in joint international projects, internships abroad, academic mobility programmes	B
7.	A system of financial and non-financial incentives for teachers	B
8.	Availability and use of clear, transparent and objective criteria for: – Hiring staff including teachers from foreign educational institutions, assignment to positions, promotion, dismissal; – Dismissal of teachers with low level of professional competency	A
9.	A system for career development and professional advancement for teachers	A

Analysis of the educational programmes' compliance with the standard:

Over 40 teachers take part in implementing the educational programmes of the cluster "Electronics and Nanoelectronics". The teaching staff includes: Candidates of Sciences, Doctors of Sciences - 15 %, Professors - 15%. The total share of the teachers with scientific degrees is 95%. The level of qualification of the programmes' teaching staff is high. Up-to-date information on every teacher, their publishing activity, is available on-line. Almost all the teachers graduated from the Faculty of Physics of the University, this is why their specialties, scientific degrees and titles comply with the profile of the educational programmes.

The outcomes and findings of the teachers' research work are implemented in the academic process. The materials of the teachers' research work are included in scientific editions and articles, used in developing working programmes of the cluster.

The Faculty invites teachers and researchers from other organizations and foreign HEIs. The teachers and researchers, who implement the cluster of programmes "Electronics and Nanoelectronics", take part in international programmes and projects, do internships in other countries.

The University created a system of financial and non-financial recognition of the teaching staff, employees, postgraduates and students. The Regulations on rewards determine the types of rewards and the order of application and consideration of award nominations.

The University developed rules and criteria for employing staff, specifically from foreign educational and research institutions, appointments, promotions, retiring, which are approved by the collective employment agreement.

Achievements:

The high level of the teaching staff's qualification. High confidence of students in the training.

The conformity of the specialties, scientific degrees and titles with the profile of the educational programmes.

High scientometrical indexes of the teaching staff.

Implementation of the results of research work in the academic process.

Recommendations:

It is recommended to extend academic exchange and mobility.

It is advisable to increase the number of teachers and research workers from foreign educational and research institutions.

It is recommended to involve practical specialists and representatives of employers in the academic process of the programmes "Electronics and Nanoelectronics", which includes lecturing, practicums and participation in preparing evaluation materials for taking different types of internships, determined by the curricula of the cluster.

It is advisable to provide the opportunity of employment and career advancement for the best graduates of the Faculty.

It is recommended to improve the system of financial and non-financial support of the teaching staff.

3.6 Standard 6. Learning resources and student support

Compliance with the standard: ***Significant compliance***

Table 6 - Criteria to Standard 6

№	Subject of Evaluation	Mark
1.	Provision of the study programme with material and technical recourses in accordance with the requirements of the curriculum (modern tools, equipment, computers, classrooms, laboratories)	B
2.	Availability of up-to-date library and information resources including those for independent study and research work	A
3.	Availability of infrastructure to ensure access to quality education to students with different opportunities and of different age, and to provide the development of social and educational component of the academic process	A
4.	The system of feedback on the satisfaction with conditions and organization of the study process should be in place	A
5.	Availability of accessible information about opportunities for student mobility and its support system	B

Analysis of the educational programmes' compliance with the standard:

The material and technical resources of the Faculty of Physics are up-to-date. The laboratories are equipped with modern devices and computers, which are sufficient for the academic and research work of the students of

programmes 11.04.04 and 11.03.04 "Electronics and Nanoelectronics", 28.03.01 "Nanoelectronics and Microsystems Engineering". Certain requirements for material, technical and methodological provision are determined by the syllabi of the academic disciplines 11.04.04 и 11.03.04 "Electronics and Nanoelectronics", 28.03.01 "Nanoelectronics and Microsystems Engineering", 11.06.01 "Electronics, Radio Engineering and Communication Systems".

The information on material and technical resources, available for conducting all types of disciplinary and interdisciplinary training, practical work and research, is posted on the University's web-site.

The Faculty of Physics is fitted with special lecture halls, which provide the opportunity to conduct classes in the system of e-learning and organize independent work.

The financing system of the University is centralized and does not involve independent financing of separate educational programmes. The department of finance and accounting develops the budget, which involves designing short-term and long-term financial plans. The finance documents are available on the University's web site.

The students have access to UNN's Fundamental Library. The informational requirements of the academic process are met by means of constantly growing network of e-databases, which are available in the Fundamental Library locally or on-line. The University's Fundamental Library provides basic academic and methodological literature, which is necessary for implementing the academic process of every discipline.

The social infrastructure of the University provides for the quality training of students of diverse capabilities and age groups. The students from socially vulnerable groups get material assistance, various monetary remunerations from the Fund of social support of students and non-budgetary resources of the University.

The Centre of Quality assurance of the Faculty of Physics conducts questionnaires with the purpose of determining the students' opinions on various aspects of the educational process, its problems through the feedback system "student – tutor – teacher – HEI's administration".

Achievements:

The educational programme is provided with material and technical resources, contemporary equipment, devices and computer hardware. The library and informational resources are available and sufficient for independent work. The developed infrastructure promotes the increase of the level of the students' contentment with the conditions of educational programmes implementation.

The feedback system student – teaching staff – Faculty administration works effectively.

Information on academic mobility is available for students.

The infrastructure provides quality training for students of different capabilities and age groups.

Recommendations:

Some laboratory equipment needs renewal (for example, laboratories of general physics).

It is recommended to consider opportunities of allocating a part of the budget for the maintenance of the unique equipment, its routine and complete repair.

It is advisable to involve employers in creating special laboratories on the University's base.

It is recommended to renew the software and consider the necessity of purchasing special licensed software.

It is advisable to improve the feedback system from students on the conditions and organization of the study process.

3.7 Standard 7. Collection, analysis and use of information for managing the educational institution

Compliance with the standard: ***Significant compliance***

Table 7 - Criteria to Standard 7

№	Subject of Evaluation	Mark
1.	Availability and effectiveness of the system for collecting and monitoring information about the study programme	A
2.	Participation of students and staff of the educational institution in collecting and analyzing information for managing the study programme	B
3.	The educational institution should have in place a unified effective information system on the basis of modern information technologies for managing the study programme	A

Analysis of the educational programmes' compliance with the standard:

The digital educational environment of the University is well developed, and provides students with the access to digital resources and services, information related to the academic process. The main access point for the digital educational environment is the corporate portal.unn.ru, which is available from anywhere. The main opportunities, which are provided by the Portal: documentation of the academic process, assessment results; access to curricula and syllabi; access to digital educational resources and e-library systems; portfolio; communication and interaction with other parties of the academic process; schedule of classes.

The students take part in the procedures of collecting information on the educational programmes. The collection and the monitoring of information on the programmes is performed according to the local regulations. The collection of information for analyzing the efficiency of the study process, managing the educational programmes is conducted on the basis of the University's informational system "Galaktika. HEI management system".

The collection of information on students' progress is performed by the Office for academic work, Departments and the Office for youth policy and educational work of the University. The collection and presentation of information on the students' progress is conducted by means of filling in portfolios, available in the students' personal accounts.

All the University's digital resources and databases are combined in the united digital network. The mechanism of data exchange between various digital systems is based on the integrating platform. The digital systems of

managing the academic process are integrated with the managerial and finance databases of the University.

Achievements:

The digital informational environment, which includes the system of monitoring and collecting information on the educational programme, is very effective.

The University created conditions for active participation of the students and teaching staff in collecting and analyzing information for the management of the educational programmes.

The HEI has the unified digital network and digital educational environment. The systems are effective due to the implementation of informational technologies in the management of the educational programmes.

Recommendations:

It is recommended to improve the involvement of students, employees and teachers in the collection and analysis of information for the management of the educational programmes. It is also recommended to improve the feedback system between the teaching staff, employees and students.
It is advisable to complete the e-learning system with the elements of mobile e-learning (m-learning).

3.8 Standard 8. Public information

Compliance with the standard: ***Full compliance***

Table 8 - Criteria to Standard 8

№	Subject of Evaluation	Mark
1.	Effective use of the official website of the study programme for its quality enhancement	A
2.	Publication of complete and accurate information on the study programme and its achievements on the official website of the educational institution and mass media	B
3.	Publication of objective data on the employability of graduates	A
4.	Integration in the environment, interaction of the educational institution with different professional associations and other organization including those from abroad	A

Analysis of the educational programmes' compliance with the standard:

The information on the educational programme "Electronics and Nanoelectronics" (11.03.04, 11.04.04), which is available on the University's web site, is complete. Additional information is posted on the web site of the Department of Physics of Semiconductors, Electronics and Nanoelectronics.

The complete package of official documents of the cluster of educational programmes "Electronics and Nanoelectronics" (11.03.04, 11.04.04) is available on the University's web site. The advertising information on the educational programmes "Electronics and Nanoelectronics" for the applicants is posted on the University's web site. The Faculty of Physics keeps applicants and their parents aware of the Faculty's life, employability of the graduates and admission rules.

The information on employability is freely available and reliable. The University's graduates have all the necessary information on major employers, vacancies and available internships. The University continuously monitors the employability of graduates and labor market requirements.

The Faculty of Physics pays much attention to cooperation with employers. The University signed contracts for organizing work placement, State Final Attestation and employment with the majority of the employers.

Achievements:

The information on the educational programme "Electronics and Nanoelectronics" (11.03.04, 11.04.04), which is available on the Faculty's web site, is complete.

Aside from the Faculty's web site, additional information is available on the web site of the Department of Physics of Semiconductors, Electronics and Nanoelectronics.

The complete set of the approved documents on the educational programme "Electronics and Nanoelectronics" is available on the web site.

The information on the employability of the graduates is available and regularly updated.

Recommendations:

In order to improve foreign stakeholders' awareness, it is recommended to expand information on the educational programme, presented on the English version of the web site.

It is advisable to use social networks for informing and improving a positive attitude to the educational programmes.

It is recommended to provide more information on the educational programme for visually impaired web site users.

3.9 Standard 9. On-going monitoring and periodic review of programmes

Compliance with the standard: ***Significant compliance***

Table 9 – Criteria to Standard 9

№	Subject of Evaluation	Mark
1.	Documented procedures of monitoring and periodic review of study programmes should be in place	A
2.	Availability of a feedback mechanism for students, employers, branch ministries and departments (key stakeholders in employment) in the process of monitoring and periodic review of a study programme	B
3.	Effectiveness of procedures for monitoring and periodic review of a study programme (enhancement of programmes)	B

Analysis of the educational programmes' compliance with the standard:

The University regularly conducts the monitoring and periodic reviews of the educational programmes. The information necessary for reviews is acquired through surveying students and key employers.

The programmes of the cluster "Electronics and Nanoelectronics" are regularly evaluated and reviewed according to the modern trends of the labor

market and achievements of science, up-to-dateness of the studied disciplines and employers' recommendations.

The programmes of the cluster "Electronics and Nanoelectronics" are annually analyzed and evaluated at the meetings of the Department of Physics of Semiconductors, Electronics and Nanoelectronics, the Academic and Methodological Committee and the Academic Council of the Faculty of Physics. The schedule of revision of the curricula and syllabi of academic disciplines is approved.

The sector of monitoring of the academic process collects and analyzes information on students' contentment with the academic programmes. It conducts the monitoring of the academic load, academic progress and results of evaluation of students and graduates.

After the internal evaluation of the cluster "Electronics and Nanoelectronics" amendments are made to the curricula and syllabi of academic disciplines and practicums.

The feedback from employers is conducted through the monitoring of employers' opinions on the training quality.

Achievements:

The monitoring and evaluation of the educational programmes are performed regularly.

The educational programmes are annually analyzed and improved according to scientific achievements and pedagogical innovations. The schedules of revision of the curricula and syllabi of the academic disciplines are approved.

The mechanism of feedback "students – employers and key employment partners" is adjusted.

The graduates are satisfied with the quality of acquired knowledge. The graduates' expectations are met.

Recommendations:

It is recommended to enhance the involvement of employers in the monitoring and periodic review of the educational programmes.

It is advisable to develop the mechanism, which ensures active participation of students in the analysis and development of the educational programmes.

3.10 Standard 10. Cyclical external quality assurance of study programmes

Compliance with the standard: ***Full compliance***

Table 10 - Criteria to Standard 10

№	Subject of Evaluation	Mark
1.	Periodic review of a study programme	A
2.	Availability of a corrective actions programme to follow up the results of external evaluation of study programmes	A
3.	Consideration of the results of previous procedures of external evaluation when conducting subsequent external procedures	A

Analysis of the educational programmes' compliance with the standard:

The external evaluation of the educational programmes is performed regularly. All the educational programmes, which are delivered by the University, successfully passed State Accreditation in May 2018. The results of successful procedures of the external quality assurance of UNN's educational programmes are the "Certificate of State Accreditation" № 2847 of 13.06.2018 and the recognition of the University as an effective HEI according to the indexes of effectiveness of educational institutions.

Starting from 2011 the University takes an active part in international and national rating systems, which are designed to evaluate Universitys' performance.

The educational quality evaluation was conducted 3 times by the Chamber of Commerce and Industry of the Russian Federation. The University is granted Diplomas of Certification; UNN is included in the Register of the Chamber of Commerce and Industry of the Russian Federation. In order to develop practices of public accreditation, in 2011 the University underwent the certification procedure at the European Organization for Quality (EOQ). The University is included in the register of EOQ.

Instructions after the preceding quality evaluation procedures for improvement the programme cluster "Electronics and Nanoelectronics" were not issued.

By now the Faculty of Physics has not undergone any procedures of public accreditation of educational programmes.

Achievements:

The University successfully passed the State Accreditation of all the educational programmes and was awarded the Certificate of State Accreditation.

During 8 years UNN has participated in international and national HEI ratings with positive dynamics.

There are no instructions for improvement of the accredited educational programmes.

The University intensifies its efforts in conducting public accreditation procedures.

4. RECOMMENDATIONS FOR IMPROVEMENT

Thus, based on the analyses of the presented documents, meetings and interviews conducted during the site-visit, with the purpose of enhancing the quality of implementing the educational programme under accreditation the Review Panel recommends that:

1. It is advisable to improve the participation of students and employers in the evaluation of the programmes and development of requirements for forming graduates' competencies; to develop more effective methods for involving students in cooperative development of the educational process.

2. It is recommended to reduce numerous bureaucratic procedures, which slow down the implementation of the programmes. It is recommended to allow the administration of the programmes more freedom in making decisions in strategic and financial issues. It is recommended to improve the system of financial and non-financial support of the teaching staff.

3. In order to improve the compliance of the educational programmes with international standards, it is recommended to involve foreign teachers and researchers in the process of programme design. It is advisable to improve students' motivation for academic mobility, increase the number of foreign students at the Faculty of Physics for studying the programme "Electronics and Nanoelectronics". It is advisable to increase the number of UNN's students, who undergo internships and short-time study courses in foreign HEIs and research centres. It is advisable to improve procedures of mutual recognition for those, who take foreign internships and academic courses. It is advisable to provide additional courses of the English language for the students with a focus on understanding special technical texts and documents.

4. It is recommended to involve practical specialists and representatives of employers in the academic process of the programmes "Electronics and Nanoelectronics", which includes lecturing, practicums and participation in preparing evaluation materials for taking different types of internships, determined by the curricula of the cluster. It is advisable to specify the procedures of cooperation with employers related to regular agreeing the syllabi of special courses of the Master programmes.

5. It is recommended to improve the work on involving representatives of professional community in developing professional standards.

5. CONCLUSION

Based on the self-evaluation report analysis, documents and data submitted the External Review Panel has come to the conclusion that the cluster of educational programmes in "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication Systems" (11.06.01) **fully** complies with the standards and criteria of public accreditation of the National Centre for Public Accreditation.

The Panel recommends that the National Accreditation Board accredit the cluster of educational programmes in "Electronics and Nanoelectronics" (11.03.04, 11.04.04), and "Electronics, Radio Engineering and Communication Systems" (11.06.01), delivered by the Federal State Autonomous Educational Institution of Higher Education "National Research Lobachevsky State University of Nizhny Novgorod", for the period of **6** years.

ANNEX A

SCHEDULE OF THE SITE VISIT OF THE EXTERNAL REVIEW PANEL

Time	Activity	Participants	Venue
December 10, Tuesday			
9.15	Arrival at the University		Building 2, 23, Gagarina Pr.
09.30 — 11.00	First meeting of the External Review Panel		Room 338, Building 2, 23, Gagarina Pr.
11.00 — 12.00	**Meeting of the ERP with the University administration and people responsible for accreditation**	Rector, Vice-Rectors, people responsible for accreditation, ERP	Research Hall, Building 2, 23, Gagarina Pr.
12.00 — 13.00	Tour of the University (visiting classrooms, library, etc.)	ERP	University campus, 23, Gagarina Pr.
13.00 — 14.00	Lunch		Dining Room, 23, Gagarina Pr.
14.00 — 14.30	Internal meeting of the Panel	ERP	Room 234, Building 3, 23, Gagarina Pr.
14.30 — 15.30	**Meeting with the Institute Director/Deans**	Institute Director, Deputy Directors, ERP	Room 227, Building 3, 23, Gagarina Pr.
15.30 — 16.00	Work with documents	ERP	Room 234, Building 3, 23, Gagarina Pr.
16.00 — 17.00	**Meeting with Heads of Departments**	Heads of Departments, ERP	Room 227, Building 3, 23, Gagarina Pr.
17.00 — 17.30	Internal meeting of the Panel	ERP	Room 234, Building 3, 23, Gagarina Pr.
17.30 — 18.30	**Meeting with graduates**	Graduates, ERP	Room 227, Building 3, 23, Gagarina Pr.
18.30 — 19.00	Internal meeting of the Panel	ERP	Room 234, Building 3, 23, Gagarina Pr.

Time	Activity	Participants	Venue
December 11, Wednesday			
10.45	Arrival at the University		Building 3, 23, Gagarina Pr.
11.00 — 12.00	**Meeting with teachers**	Teachers, ERP	Room 227, Building 3, 23, Gagarina Pr.
12.00 — 12.30	Internal meeting of the Panel	ERP	Room 234, Building 3, 23, Gagarina Pr.
12.30 — 13.30	**Meeting with students**	Students, ERP	Room 227, Building 3, 23, Gagarina Pr.
13.30 — 14.30	Lunch		Dining Room, 23, Gagarina Pr.
14.30 — 15.00	**Meeting with PhD students**	PhD students, ERP	Room 227, Building 3, 23, Gagarina Pr.
15.00 — 17.30	Work with documents/ attending classes (optional)	ERP	Room 234, Building 3, 23, Gagarina Pr.
17.30 — 18.30	**Meeting with representatives of professional community**	Employers, ERP	Room 227, Building 3, 23, Gagarina Pr.
18.30 — 19.00	Internal meeting of the Panel	ERP	Room 234, Building 3, 23, Gagarina Pr.
December 12, Thursday			
8.15	Arrival at the University		Building 2, 23, Gagarina Pr.
08.30 — 12.00	Internal meeting of the Panel: discussion of preliminary results of the site visit, preparation of the oral report of the panel	ERP	Room 338, Building 2, 23, Gagarina Pr.
12.00 — 13.00	**Closing meeting of the External Review Panel with the representatives of the University**	ERP, University administration, Heads of Departments, teachers, students	Research Hall, Building 2, 23, Gagarina Pr.
13.00 — 14.00	Lunch		Dining Room, 23, Gagarina Pr.
	Departure		

ANNEX B

PARTICIPANTS OF THE MEETINGS

The HEI's executive staff in charge of the accreditation:

№	Name	Position	Contact information
1.	Markov Kirill Aleksandrovich	Acting Rector	rector@unn.ru (831)462-30-03
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Heads of the Departments:

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Director of the Institute/the Faculty's Dean and Deputies:

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ANNEX C

THE SCALE OF ASSESSMENT PARAMETERS OF A STUDY PROGRAMME

№ п/п	Standards	Marks			
		Full compliance	Substantial compliance	Partial compliance)	Incompliance
1.	Policy (goals, development strategy) and quality assurance procedures of a study programme	*			
2.	Design and approval of programmes	*			
3.	Student-centred learning, teaching and assessment	*			
4.	Student admission, support of academic achievements and graduation	*			
5.	Teaching staff	*			
6.	Learning resources and student support		*		
7.	Collection, analysis and use of information for managing the study programme		*		
8.	Public information	*			
9.	On-going monitoring and periodic review of programmes		*		
10.	Cyclical external quality assurance of study programmes	*			