Association for Engineering Education of Russia

Accreditation Center

PROFESSIONAL ACCREDITATION OF EDUCATIONAL PROGRAMS IN ENGINEERING AND TECHNOLOGY

GUIDELINES

FOR EVALUATION OF EDUCATIONAL PROGRAMS IN ENGINEERING AND TECHNOLOGY

Approved by
the AEER Administrative Board Decision
on 29 December 2011

(Amendments approved by
the AEER Administrative Board Decision
on 24 November 2014)

2014

CONTENT

INTRODUCTION

These guidelines are designed for the program evaluators of the Association for Engineering Education of Russia (AEER) involved in the audit of educational programs in engineering and technology (hereinafter – *evaluation team* or *team*). The guidelines provide an overview of an evaluation process of the programs leading to a degree/diploma in accordance with the AEER criteria and procedures. The program has to meet the standards of the AEER in order to be accredited by the professional community. The criteria are sent to the program evaluators of the Accreditation Center of the Association for Engineering Education of Russia (the AC AEER) and are available on the web-site of the Accreditation Center: http://www.ac-raee.ru.

The primary principle of the AEER evaluation procedure and criteria is to ensure that graduates of the program under accreditation are prepared for engineering practice adequately to the contemporary requirements for specialists in engineering and technology and that a higher education institution (HEI) has an effective system aimed at improvement of education and university programs.

The AEER Accreditation Center develops the evaluation system and criteria accumulating the experience of professional accreditation of engineering programs in Russia and worldwide and hiring observers from engineering organisations and accreditation agencies of the EU countries and the Washington Accord member states.

The main elements of the evaluation process are self-study of a program prepared by an institution and an audit visit of the AEER program evaluators. The Association for Engineering Education of Russia considers that they both are essential for helping the institution in quality evaluation of its educational services and defining measures for improvement of the program. It is essential that the relationship between the HEI and the AC AEER is based on terms of partnership to assure high quality of graduates' training.

The Accreditation Center of the AEER would appreciate all comments on these guidelines and suggestions on the criteria and procedure improvement that can be further e-mailed at ac@ac-raee.ru.

EVALUATION TEAM REQUIREMENTS

An evaluation team for examining a program consists of program evaluators that are experts in the field of examined engineering programs and one representative from industry.

One of the members of the evaluation team is appointed a team chair who acts as the team leader, contributes to the visit preparation, coordinates work of program evaluators during the audit and is responsible for preparation of accounting documents.

All members of the evaluation team should observe the Code of Ethics and share ideas and principles of professional accreditation of the Association for Engineering Education of Russia:

1. The program evaluators are responsible to the institution under evaluation and to the AEER.

2. The program evaluators should be ready to pay a great deal of time and efforts to manage the posed tasks.

3. The program evaluators must evaluate in qualitative and (where applicable) quantitative terms:

- the mission of an institution of higher education,
- the program objectives, learning outcomes, and their correspondence with the mission of the institution and stakeholders' needs,
- the adequacy of ways of the objectives achievement and assessment methods of their efficiency,
- the system of ongoing monitoring of the educational process and improvement of its efficiency,
- the complex system aimed at meeting the AEER criteria.

4. The program evaluator must

- be competent to examine the educational program,
- be educated at seminars and training workshops or have experience as an observer in audit.

5. The team chair must

- have experience as an expert involved in an educational programs audit visit

6. The representative from industry must

- have professional experience as a top manager not less than 5 years.

CODE OF ETHICS FOR THE AEER PROGRAM EVALUATOR

To achieve the best results of evaluation procedure and to contribute to education quality, the Code of Ethics for the AEER expert poses main rules of conduct that an examiner should follow. The program evaluator involved in the program audit should meet high ethical standards: professionalism, honesty, impartiality and fairness.

1. Professionalism

1.1. The program evaluator should be a professional in the field of examined engineering programs.

1.2. The program evaluator takes responsibility for high quality of the audit by means of thorough analysis of the program in compliance with the AEER criteria. The expert has to reveal all latent and obvious contradictions with the AEER criteria.

2. Solution of the conflict of interest

The program evaluator should refrain from actions averted objectivity and reliability of the evaluation process as follows:

2.1. To avoid contradiction between personal interests and the AEER objectives the program evaluator involved in the audit of an program must notify to AC Board of Directors of his/her concernment in order not to participate in the evaluation process if he/she has or had close contacts with this institution. Close contacts include, but are not limited to: graduation, current or past employment, consultancy on accreditation process, current or past negotiations on employment at this institution within last 10 years, and financial or personal interests.

2.2. During the audit visit the program evaluator must keep himself/herself away from the meetings and decisions that may cause a conflict of AEER interest and must inform about a real or latent conflict of interest that may influence the objectivity of the evaluation process.

2.3. The program evaluator must not receive money or gifts from the institution that offered the program to accreditation since it may influence an audit decision.

2.4. The program evaluator must keep the audit process independent of influence of the institution representatives with the purpose to provide impartiality and objectivity of education quality assessment. **The self-study report submitted by the**

institution shows an official opinion of the institution representatives, it is the task of program evaluators to carry out the independent audit of verity and completeness of information presented by the institution.

3. Confidentiality

Confidentiality is an essential principle of the AC AEER activity. All information and documentation sent to the Accreditation Center of the AEER is subject to non- disclosure and should be used only for evaluation and accreditation purposes.

3.1. The evaluation team (chairman, program evaluators and observers) takes responsibility for non-disclosure of confidential information.

3.2. The information contained in a self-study report and work sheets completed during an audit visit can be used for a purpose of the program evaluation by the AEER and not for personal profit.

3.3. The information shall not be distributed and disclosed without consent of the AEER and the institution.

3.4. The work sheets of the AC AEER (F-1 – F-7) are **for internal use only** and their content shall not be discussed with representatives of the institution. All audit documents are the intellectual property of the AC AEER. Evaluation contained in work sheets is not communicated to representatives of the institution.

3.5. Preparation of the audit report is to take place without participation of representatives of the institution.

3.6. Before the beginning of evaluation team signs the Statement of obligation of AEER program evaluator of absence of the conflict of interests and sends it to the AC AEER.

EVALUATION PROCEDURE

1. The institution submits a written **application** for program accreditation to the Director of the AEER Accreditation Center (AC AEER). In the application the institution must indicate the title and the code of the program to be accredited. If the institution seeks accreditation for several programs, the title and the code of each program must be clearly indicated. The request is subject to initial analysis if the title of the qualification relates to the field of engineering and technology in line with the Russian classification of professions by education. The analysis of the request is done collegially by the AEER AC Board of Directors. The AC Board of Directors consists of four persons: the AC Director, the AC Deputy Director, two Members of AC Board of Directors.

The members of the AC Board of Directors do not have a right to vote on the questions of initial screening of the HEI's application that is in their sphere of interest. To avoid the perceived conflict of interest and to ensure the open and fair discussion of the application these members of the Board are leaving the meeting room during the session.

The request can be denied on the following reasons:

- Incorrect filling in of the request form.
- The program is not included in the state list of educational programs.
- The program is not included in the list of engineering qualifications of the Russian Federation Ministry of Labor.
- The HEI lacks the federal license and state accreditation.
- The information about the educational program is not available on the HEI's web-site.

The HEI has the right to consider the remarks and repeat the request. In case of disagreement with the AEER AC Board of Directors decision on the denial of the initial request concerning accreditation of education program, HEI appeal in writing to the Appeal Commission of the AEER. The appellation should contain the reasons why the negative decision of the AEER AC is wrong (due to the factual mistakes or due to incompliance to the document "Criteria and Procedure").

2. The AEER AC Board of Directors takes the decision to start the procedure of public accreditation. The AEER signs a **contract** with HEI on educational program public accreditation. To avoid the perceived conflict of interest the administrative support of the accreditation process is done by the AC staff in one of the branches-that

is unbiased regarding the HEI applying for accreditation.

3. The Accreditation Center provides the institution with the latest version of the criteria and self-study questionnaires.

4. The institution carries out a **self-study process** according to the AEER requirements and submits a self-study report to the Accreditation Center.

5. The Accreditation Center appoints an **Evaluation Team** to carry out an auditing of the program. The Evaluation Team should comprise not less than four experts and consist of a chair, program evaluators as well as a representative from industry. If the institution seeks accreditation for several programs, the Accreditation Center appoints a separate Evaluation Team for each program.

6. The institution officially informs the Accreditation Center on refusal of a team member or on agreement to accept the proposed examination team.

7. Each program evaluator signs the statement for no-conflict of interests and sends it to the Accreditation Center.

8. Upon examination of a self-study report the Accreditation Center takes decision on continuation of accrediting procedure and running of the on-site visit or on necessity to re-elaborate the self-study report or decision on noncompliance of the program with criteria and failure to receive accreditation.

In the last cases the institution will receive a written statement from the Accreditation Center.

9. In case the decision on continuation of accrediting procedure is taken, the team chair, Accreditation Center and the institution agree on the dates and schedule of the visit.

10. An on-site visit takes not less than three days. At the end of the visit the team chair and the HEI rector sign the **Minutes of the Audit.**

11. On the basis of the audit results and the self-study report analysis the Evaluation Team prepares an **evaluation report** that shall contain a detailed statement on compliance or noncompliance of the program with the AEER criteria as well as examiner opinion different from the team statement, if any.

12. Within three weeks following the on-site visit one copy of the report is presented to the institution. Within the two weeks of receiving the report, the institution may send its **complaints** on team report or breach of accrediting procedure to the Accreditation Center.

13. The Accreditation Center reviews the report of the examination team and the institution complaints, if any, and prepares a **suggestion on accreditation or non-accreditation** for a final decision by the Accreditation Board.

14. The decision of the Accreditation Board **is to be approved by** the AEER Administrative Board. The AEER sends an accreditation certificate signed by the President to the institution. The accredited programs are included in the AEER register that is publishing in media and the Accreditation Center web site. The list of accredited programs is reported to the Ministry of Education and Science of the Russian Federation.

15. In case of program accreditation with awarding the EUR-ACE® Label the AEER AC issues for HEI the corresponding certificate signed by representatives of the AEER and ENAEE. The accredited program is placed to the ENAEE register.

Stage 1. Pre-Visit Activity

Pre-visit activities begin with self-study documentation submitted by the institution to the AC AEER and appointing an evaluation team.

Objectives of the evaluation team at this stage:

1. an HEI's educational programs will be initially evaluated on the basis of data submitted by the institution to AC AEER in the form of a self-study report;

2. to develop a plan for additional assessment to be conducted **during the on-site visit** and to request supplementary information to be provided by the institution prior to the visit and/or during the on-site visit. Since the team's task is the evaluation of the degree of educational program implementation within the context of AEER evaluation criteria, the plan should provide performance analysis of those AEER requirements, which have not found sufficient evidence in self-study materials so far.

Participants:

1. Members of the evaluation team;
2. Institution representatives responsible for the accreditation arrangements.
3. The AC AEER.

Step 1. Analysis of self-study materials

1. **The AC AEER** acknowledges receipt of self-study report and sends e-copies of the report to the evaluation team members.

2. **The program evaluators** scrutinize the self-study report and share their opinion on information comprehensiveness and compliance with the AEER criteria with the team chair. Members of the evaluation team fill out the work sheet F-1 and send it **to the team chair** and **AC AEER**.

Work sheet **F-1** is a preliminary conclusion about conformity of the program to AEER criteria and is filled out on the basis of self-study materials. On the one hand, F-1 is used for the AC AEER decision on expediency of carrying out the audit at the present time; on the other hand, it is a basis for scheduling work in the institution. If all experts have come to conclusion that any criterion is not carried out completely (evaluation grade "-2"), it can be the reason for termination of accreditation or inexpediency of audit in the institution at the present moment. Accordingly, grades "-1" and "0" should lead to more careful performance analysis concerning criteria requirements during the visit, which has to be reflected in the plan of the evaluation team. The grade "+" in Work sheet **F-1** shows that the criterion meets the established requirements.

To evaluate the degree of meeting the criteria requirements, it is recommended to use the following system:

"+" – fully meets a criterion

"0" – the disputable indicator (*questionable matter*) shows that at present the expert has no the information sufficient for taking the unequivocal decision and additional information is required during the visit.

"-1" – a program has weaknesses; it shows that conformity to the criterion requirement is reached but the conformity degree is still inadequate to secure the program quality till the next accreditation period.

"-2" – a program has deficiencies; it shows that conformity to the criterion requirement is not reached.

3. The decision on continuation of the accreditation procedure or its rejection is made **by the Board of Directors of the AC AEER** on the base of the compiled work sheets F-1 submitted by the experts. Obvious contradictions between the program and the AEER criteria are among the reasons for the rejection. Besides, if the program evaluators consider submitted information insufficient for arranging the audit visit, they might suggest that the institution has to be re-examined. If the audit visit is canceled, **the AEER AC** sends a conclusion on required improvement of self-study documentation and/or non-compliance with the AEER criteria thus explaining impossibility of accreditation of the offered program under these circumstances.

<u>Step 2.</u> Coordination of the visit agenda

1. Thorough analysis of self-study materials and a detailed plan of work in many respects will facilitate teamwork in the institution under accreditation. When drawing up the agenda for meetings with teaching staff and students and planning visits to laboratories/classrooms/departments, it is necessary to divide the team into working groups for more efficient use of time and detailed study according to program evaluators' specialization and interests.

Development of the plan of work is a responsibility of the chairman (taking into account the recommendations of the AC AEER). The draft plan is developed on the basis of self-study materials and consultations of experts (the sample plan is presented in Appendix 1).

When scheduling the work of the evaluation team, the AEER AC pays attention at the following:

− The plan should provide performance evaluation of all AEER criteria requirements to the program under accreditation. The program evaluators have to be convinced that the program provides acquisition of ALL skills and competencies and the students' works confirm acquisition of these skills in compliance with AEER requirements.

− The evaluation team should prepare the list of materials which, if necessary, should be presented by the institution under accreditation during the visit for specification and/or addition of self-study materials.

− It is strongly advisable to avoid group tours in academic buildings and to specify the laboratories and classrooms that should be visited by a particular program evaluator instead; all visits should be purposeful and proved.

− Meetings with the representatives of the institution should be productive and aimed at verification or acquisition of the information lacking in self-study materials. The evaluation team should specify the teachers (usually they are course developers) whom they might want to meet.

− Meetings of the team with the representatives of the program under accreditation should be normally spent in a premise allocated for work of the evaluation team. It is necessary to minimise the loss of time caused by unnecessary movement of the team.

− For filling out Work sheet **F-3**, the experts are to request supplements to the students' diploma of the most recent graduates of the program under accreditation.

− The evaluation team prepares a list of materials to be presented by the institution during the audit visit to specify and/or add self-study documentation (if necessary) (e.g. to fill out Work sheet **F-3**, the experts should request for diploma

supplements of the program graduates of the last academic year).

2. **The team chair:**

− requests the institution for additional information indicating the deadline for its submitting;

− specifies the dates for the on-site visit and coordinates them with the institution (jointly with the AC AEER);

− coordinates the development of a preliminary schedule for the on-site visit with each member of the evaluation team (jointly with the AC AEER);

− adjusts the schedule for the on-site visit with the institution (Appendix I), informs the institution about the dates and time of arrival and departure of the evaluation team (jointly with the AC AEER).

3. **The program evaluators:**

− print necessary worksheets;

− fill out those parts of the work sheets that should be completed prior to the on-site visit (**F-1, F-2, F-4**);

− adjust the schedule for the on-site visit with the team chair and AC AEER.

4. **The institution** provides to the evaluation team:

− a premise equipped with the computer with the Internet access, the printer and the phone;

− the documents prepared for the evaluation team, including self- study materials, teaching and methodology materials and documents, samples of students' works, course and degree projects, etc.

Stage 2. On-site Visit

On-site visit activities begin with the initial meeting of the members of the evaluation team in a hotel and are over when agenda of the visit has been accomplished and the team leaves the institution.

Objectives of the evaluation team at this stage:

1. To assess (both in qualitative and quantitative terms) those factors that cannot be documented in a written questionnaire;

2. To scrutinize the information presented by the institution;

3. To be aware of the fact that the representative of industry should pay particular

attention to estimation of graduates' preparedness for professional activity and compliance of their training with the present-day requirements and needs of potential consumers;

4. To provide the institution with preliminary assessment of its strengths and weaknesses.

The AC AEER provides organizational interaction with the institution, general coordination of the work of the evaluation team and monitoring of the implementation of the accreditation procedure.

Participants:

1. Institution representatives including top management and administration of the department, teaching and support staff involved in the program;
2. Students of the program;
3. Members of the evaluation team;
4. The AC AEER.

The schedule for the on-site visit must contain the meetings of experts with:

- students;
- teaching staff.

Attention!

The meetings of program evaluators with the students should be held without attendance of the teaching staff and the administration of the Faculty and the institution.

The meetings of program evaluators with the teaching staff should be held without attendance of the administration of the Faculty and the institution.

The on-site visit activities should present a set of logical, step-by-step actions. For convenience, it is described here chronologically on a day-by-day basis. Time indicated for the events can vary.

Day 1

Prior to the official visiting of the institution, members of **the evaluation team hold** an initial meeting in the hotel.

1. **Evaluation team members:**

− exchange opinions on conformity of the program under accreditation to AEER criteria on the basis of self-study materials presented by the institution;

− complete the Work sheet **F-4** (the column "Pre-visit estimate / Day 1") on the basis of self-study materials and discussion of their contents;

− discuss the problems, which should be solved during the visit;

− appoint working sessions and activities, which should be performed during the evaluation visit;

− discuss the questions connected with the interaction of team members.

2. The Team Chair:

− adjusts the plan of work according to the discussion outcomes;

− defines the duties of the representative of industry during the audit and appoints meetings and activities in which he/she participates.

3. The representative of the AEER AC:

− submits the relevant information for the draft report using the criteria fulfillment of which is undoubtedly presented in the self-study materials.

Day 2

1. The evaluation team meets with the administration of the institution and individuals responsible for accreditation visit arrangements. The team chair introduces members of the evaluation team and requests for the rector's approval on the plan of evaluation team activities during the audit visit.

2. The program evaluators follow the approved plan of activities that obligatorily includes a meeting of the team chair with a Dean of the Faculty under evaluation.

3. The program evaluators complete the work sheet **F-2 (the section** that should be completed during the visit), sheet **F-3** and the column "Day 2" of the Work sheet **F-4** based on the information received during the day.

4. At the evening meeting the program evaluators discuss the findings concerning program assessment and adjust the plan of activities for the next day.

Day 3

1. The program evaluators follow the approved plan of activities.

2. The program evaluators complete the column "Day 3" of the form **F-4** upon the information received during the day.

3. At the evening meeting the program evaluators discuss the findings concerning program assessment and adjust the plan of activity for the next day.

Day 4

1. The evaluation team finishes discussion of conformity of the program to AEER criteria, and fills out report work sheets. Work sheets **F-1**, **F-2**, **F-4** are to be signed individually by all members of the evaluation team and are passed to the representative of the AC AEER.

2. The industry representative fills out and signs the Work sheet **F-6**.

3. The final program evaluation Work sheets **F-7**, **F-3** and **F-5** are to be signed by all members of the evaluation team (excepting the industry representative) and are passed to the representative of the AC AEER.

4. On the basis of the all-round analysis of audit outcomes and self-study materials the evaluation team prepares the draft report on educational program evaluation, which represents the detailed conclusion concerning the conformity of the program under accreditation to the established accreditation criteria and includes alternative opinions, if any, of evaluation team members.

5. The Chairman of the evaluation team prepares the **Minutes of the Audit** (Appendix 3).

6. The evaluation team discusses the results of the visit with the management of the institution and the persons responsible for carrying out accreditation at a final meeting. The Chairman of the evaluation team will read the Evaluation Team Message (Appendix 4).

7. The top management of the institution and the chairman of the evaluation team sign two copies of the Minutes of the Audit. One copy remains in the institution, another one is passed to the representative of the AEER AC.

Report structure:

a. General description of the institution and the program.

The given section is to contain the following:

- information on how long the institution has been providing specialists training on the program under accreditation;
- information concerning enrollment figures for the program under accreditation;
- certificate number and the date of state accreditation, license number for

carrying out educational activities;

− information concerning the institution structure, number of implemented programs (including engineering programs).

b. The Body.

The body contains the detailed conclusions concerning conformity of the program under accreditation to AEER criteria and specifies strengths and weaknesses of the program with each criterion in view.

Using the evaluation in Work sheet **F-4**, it is necessary to give one of possible evaluation descriptors for each criterion:

- ***"acceptable"***
- ***"acceptable with recommendations"***
- ***"acceptable with remarks"***
- ***«non-acceptable».***

For the evaluation descriptors **"acceptable with recommendations"** and **"acceptable with remarks"** the team program evaluator has to:

- specify the weaknesses or deficiencies of the program;
- make the recommendations on elimination of weaknesses or deficiencies, and to note whether the institution is capable of providing relevant measures aimed at elimination of these deficiencies.

General evaluation of criterion performance should be resulted from the discussion of program evaluators with estimations given by each program evaluator in view.

If the team has not come to agreement concerning estimation of concrete criterion, it is necessary to specify individual experts' opinions with a mark "Separate opinion".

c. Conclusion

If the body of the report contains weaknesses or deficiencies of the program under accreditation and provides recommendations on their elimination, it is necessary to specify the schedule for the institution to take all necessary steps on performance improvement such as corrective action plan and progress report.

Further the evaluation team should specify the recommendations concerning acceptable accreditation decisions. The following suggestions are possible:

To accredit for the full term (5 years):

– If the program under accreditation shows full conformity to requirements of each criterion if the evaluation has been recognized as "acceptable" by all criteria.

– If the program under accreditation has been recognized as ***"acceptable with recommendations"*** by one or several criteria and experts provided recommendations about elimination of weaknesses are made.

To accredit for a shorter term:

– If the program under accreditation has been recognized as ***"acceptable with remarks"*** by one or several criteria but improvements can be reached during the reasonable period of time (no more than half of full term of accreditation).

To refrain from accreditation:

– If the program under accreditation has been recognized as **"non-acceptable"** since at least one criterion failed.

Stage 3. Program Evaluation Report

1. The AEER AC prepares **The Program Evaluation Report** on the basis of the draft report developed by evaluation team. The report is to be coordinated with all team members.

2. **The Program Evaluation Report** prepared by the AEER AC is to be directed to the institution for correction of inaccuracies, if any.

3. **The Program Evaluation Report**, signed by the Director of the AEER AC should be sent to the institution not later than in three weeks after audit termination. Within two weeks after reception of the Report the institution can make their remarks and comments on the report or on infringement of the audit procedure, if any.

INSTRUCTIONS FOR COMPLETING THE WORK SHEETS

Work sheets of an evaluation team include the following:

a) F-1 – Preliminary evaluation of program correspondence with the AEER criteria based on the self-study documentation;

b) F-2 – Curriculum analysis;

c) F-3 – Academic credentials analysis;

d) F-4 – Review sheet of the program evaluator;

e) F-5 – Implementation of the system of the program quality management;

f) F-6 – Work sheet of the industry representative;

g) F-7 – Final program evaluation work sheet.

Attention!

Work sheets F-3, F-5 and F-7 are to be filled out in one copy by each member of the evaluation team on the basis of program evaluator conclusions.

Work sheet F-6 is to be filled out solely by the industry representative.

Work sheets F-1, F-2 and F-4 are to be filled out by the rest of the evaluation team including the chairman.

The completed work sheets are sent to the AEER AC immediately after the visit.

Work sheet F-1 (filled out and signed by each program evaluator)

A copy of Work sheet F-1 is to be filled out and sent **to the AEER AC not later than two weeks prior to the on-site visit**.

If a program evaluator considers that the reviewed program has deficiencies (grade "-2"), he/she should provide a grounded report on non-compliance of the program with the AEER criteria and impossibility of continuation of the accreditation procedure.

Work sheet F-2 (filled out and signed by each program evaluator)

The first column in Table 1 is to be completed upon the review of the self-study report of the institution prior to the on-site visit. The second columns of Table 1 and Table 2 are to be filled out during the on-site visit.

To complete Table 1, program evaluators have to scrutinize syllabi, textbooks and students' papers presented by the institution during the audit visit.

To complete Table 2, the team has to analyze the course projects and graduation papers submitted by the institution during the audit visit.

Work sheet F-3 (filled out and signed by the evaluation team)

Work sheet F-3 is filled out during the visit upon analysis of the diploma supplements of the program graduates. The team should ask for copies of diploma supplements of graduates of the most recent academic year, select transcripts of two graduates with academic progress above average, two graduates with average academic progress and two graduates with poor academic progress.

Work sheet F-4 (filled out and signed by each program evaluator)

The program evaluators should complete the column "Pre-visit estimate" prior to the visit, other columns are to be filled out during the on-site visit.

It is advisable to pay attention to the fact that the estimation "+" cannot appear in many questions in the column "Pre-visit estimate". Accordingly, some questions might require positive or negative decisions after meeting with teachers, students and studying the samples of students' works.

At the end of the visit it is necessary to clarify all contentious issues, thus, the column "Day 4" in Work sheet F-4 should not contain disputable indicators "0" (*questionable matter*).

Work sheet F-5 (filled out and signed by the evaluation team)

This work sheet is to be completed at the last meeting of the evaluation team. Estimating follow this instruction and the Matrix for implementation of a quality

management system of the program.

Provide quantitative assessment (according to the Matrix) of the following:

1. **Program objectives** are defined and maintained.

2. **Stakeholders** are involved in setting the program objectives and estimating their achievement.

3. **Processes** are effective.

4. **Assessment of learning outcomes** is made.

5. **Learning outcomes and processes** guarantee achievement of the program objectives and are used for program improvement.

6. **System of quality management** provides compliance with the AEER requirements.

Definitions given in the Appendix 4 as assumed by the AEER are to help in completing Work sheet F-5.

Note: our pressing request is to provide realistic estimation of the quality management system in the institution. It is noteworthy that the AEER uses estimation of quality management system in Work sheet F-5 only to get information on the degree of its implementation and the grades given in Work sheet F-5 will not affect the decision on program accreditation.

Individual elements of the quality management system are included into the AEER criteria requirements rather explicitly and estimated in Work sheet F-4.

Work sheet F-6 (filled out and signed by the industry representative)

The industry representative fills out Work sheets F-6.

In the case of putting down of estimations "0", "-1", or "-2" it is necessary to comment on the decision. The estimations "0" (questionable matter) should be minimum.

Work sheet F-7 (filled out and signed by the evaluation team)

This work sheet is to be filled out at a final meeting of the evaluation team and is a final document. The decision on each point in Work sheet F-7 is accepted jointly on the basis of Work sheet F-4.

CONCLUSION

Improvement of program evaluation process is due to better comprehension of accreditation goals, analysis of program evaluation results and feedback from stakeholders of accreditation process.

Association for Engineering Education of Russia

Accreditation Center

PRELIMINARY EVALUATION OF PROGRAM CORRESPONDENCE WITH THE AEER CRITERIA BASED ON THE SELF-STUDY DOCUMENTATION

Work sheet F-1 (Bachelor)

(filled out and signed by each program evaluator prior to on-site visit)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

AEER CRITERIA	Grade
CRITERION 1. **Program objectives and learning outcomes**	
CRITERION 2. **Program content**	
CRITERION 3. **Educational process**	
CRITERION 4. **Faculty**	
CRITERION 5. **Professional qualification**	
CRITERION 6. **Program resources**	
CRITERION 7. **Graduates**	

Grade rating:

Fully meets a criterion	"+"
Questionable matter	"0"
Program has weaknesses	"-1"
Program has deficiencies	"-2"

If an expert considers that the reviewed program has deficiencies (grade "-2"), he/she should provide a grounded report on non-compliance of the program with the AEER criteria and impossibility of the accreditation at present.

_____

Signature

Association for Engineering Education of Russia

Accreditation Center

CURRICULUM ANALYSIS

Work sheet F-2 (Bachelor)

(filled out and signed by each program evaluator)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

Please complete the first column of the Table 1 prior to the on-site visit.

Table 1

Analysis of curriculum' categories

Curriculum' category	Value, ECTS[1]		
	Based on self-study report (Table "Courses of the Curriculum")	**Based on on-site visit**	**Minimum in compliance with the AEER requirements**
Natural sciences and mathematics (NSM)			**60**
Advanced NSM courses			20
General professional and special disciplines (GPSD)			**110**
Advanced GPSD courses			20
Humanities and socioeconomic studies			**20-30***
Internships and final qualification project			
Other			-
Total			**240**

[1] ECTS - European Credit Transfer System

* recommended value

Table 2

Implementation of the AEER requirements for engineering design

Are the curriculum' requirements met in the following sections?	**Yes**	**No**
Design experience is acquired during the implementation of course works and projects		
Major design experience is acquired during the implementation of final qualification project		
Course works and projects prepared by students cover:		
legal and cultural aspects		
health protection and safety issues		
social responsibility for the professional activity		
sustainable development aspects		
Final qualification project covers the issues that contribute to the development of following competencies:		
managerial		
social		
economic		
legal		
ethical		
labour safety		
health protection		
sustainable development		

* Use the mark "✓" (via copy/paste functions) to choose the answer completing the table.

! This table is compiled on the basis of self-study report and analysis of course projects and final qualification works submitted by the university during the on-site visit.

! Identify and indicate <u>when exactly</u> (during implementation of course projects and final qualification project) do students demonstrate acquired professional skills and competencies covering the above-mentioned aspects.

Association for Engineering Education of Russia

Accreditation Center

ACADEMIC CREDENTIALS ANALYSIS

Work sheet F-3

(*filled out and signed by the evaluation team)*

Institution _____

Program _____

Fill out the table with the data of transcripts of two graduates with academic progress above average, two graduates with average academic progress and two graduates with poor academic progress.

Curriculum' category	**Grade point average per curriculum' category**					
	"above average"		**"average"**		**"poor"**	
Natural sciences and mathematics						
General professional and special disciplines						
Humanities and socioeconomic studies						
Other						

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Association for Engineering Education of Russia

Accreditation Center

REVIEW SHEET OF THE PROGRAM EVALUATOR

Work sheet F-4 (Bachelor)

(filled out and signed by each program evaluator)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"0" – questionable matter

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

! The column Day 1 is omitted because the members of the evaluation team do not visit the institution this day.

! When making the decision on meeting criteria requirements the expert shall make sure all evidences and confirmation certificates are available.

! By the end of the on-site visit all questionable matters shall be clarified, and column "Day 4" shall not contain questionable indicators, i.e. "0" grade.

Criterion number	Criterion content	Pre-visit estimate	Day 2	Day 3	Day 4
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**				
1.1.	Educational program has:				
1.1.1.	Program objectives are clearly defined and documented				
1.1.1.a	Program objectives are in full correspondence with the Federal State Educational Standards (educational standards of the institution)				

1.1.1.b	Program objectives are in full correspondence with the mission of the educational institution				
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders				
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives				
1.2.a	Program objectives are made public				
1.2.b	Program objectives are available for all stakeholders				
1.2.c	Program objectives are shared by each faculty member involved in the program				
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives				
1.3.1.	Program outcomes are stated as expected competencies of graduates				
1.3.1.a	Program outcomes are in full correspondence with the Federal State Educational Standards (educational standards of the institution)				
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers				
1.3.1.c	Program outcomes are in full correspondence with the AEER Criterion 5				
1.3.2	Learning outcomes are correspond to the readiness of graduates of bachelor's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving, designing, implementing and operating)				
2.	**PROGRAM CONTENT**				
2.1	The educational program has the value of at least 240 ECTS credits				
2.2.a	Program curriculum corresponds to the program objectives and ensure achievement of the learning objectives by all program graduates				
2.2.b	Program course (module) syllabus are correspond to the program objectives and ensure achievement of the learning objectives by all program graduates				
2.3.a	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide integration of professional and universal (general) competencies				
2.3.b	Program curriculum includes disciplines and cross-disciplinary modules (courses) that include personal attributes and interpersonal skills				

2.3.c	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide experience in design of technical objects, systems and technological processes				
2.4	Program curriculum includes basic and advanced courses in natural sciences and mathematics to ensure learning of fundamentals and serve the basis for obtaining required professional competencies by bachelors				
2.4.1	The courses in natural sciences and mathematics have the value of at least 60 ECTS credits including at least 20 ECTS credits for advanced courses				
2.4.2	Studies in natural sciences provide knowledge and understanding of basic phenomena and laws of nature and the ability to use them in solving complex engineering problems				
2.4.3	Studies in mathematics provide an ability to use mathematical methods in solving complex engineering problems				
2.5	Studies in humanities, social sciences and economics provide the basis for development of competencies in:				
	solving management				
	social				
	economic				
	legal				
	ethical				
	labour safety				
	health protection				
	sustainable development				
2.5.1	Studies in humanities and economics meets the requirements of the AEER criteria				
2.5.2	Studies in humanities, social sciences and economics contribute to development of competencies in the field of communication including the ability to deliver information and ideas, define problems and find their possible solutions				
2.6	Engineering courses, cross-disciplinary modules, course projects, hands-on experience and research provide readiness for complex engineering activity in accordance with the objectives of the educational program				
2.6.1	Engineering and cross-disciplinary courses meets the requirements of the AEER criteria				
2.6.2	Studies in engineering corresponds with the level of training in mathematics and natural sciences and ensure application of the				

	acquired knowledge in engineering practice				
2.6.3.a	Studies in engineering design contributes to the development of creative thinking and ability to solve complex engineering problems				
2.6.3.b	Development of project objectives and evaluation criteria, analysis and synthesis of engineering solutions is an essential element in engineering design				
2.6.4	Internships (of at least 12 weeks) is an essential element of the educational program and may result in obtaining qualification for blue-collar jobs				
2.7	Studies culminate with a final qualification project that contain research and/or R&D elements				
3.	**EDUCATIONAL PROCESS**				
3.1	Students admitted into the program meets the requirements of the AEER criteria				
3.2.a	Students' level of knowledge in natural sciences and mathematics is sufficient				
3.2.b	There is a system of academic adaptation for the students with an insufficient background knowledge				
3.3.a	Study process ensures outcomes achievement by all students				
3.3.b	There are a system of on-going evaluation of students' progress and an efficient feedback mechanism for continuous improvement of the program content and educational technologies				
3.4	*Active learning and students' self-study from open educational resources, including the resources published on the website of the institution, are applied*				
3.5	*The existence of student-centred learning environment and participation of students in the development of individual learning paths is demonstrated*				
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*				
4.	**FACULTY**				
4.1	Faculty is competent in all areas of the curriculum				
4.2	Faculty is highly qualified				

4.2.1.a	Faculty has corresponding fundamental education				
4.2.1.b	Faculty regularly improves its qualification through additional education, internships, etc. and increase pedagogical excellence on a regular basis				
4.2.2	*Faculty has experience in corresponding field of industry and is involved in research projects and engineering projects*				
4.2.3	Faculty is involved in improvement of the whole program and individual courses				
4.2.4	*Faculty holds membership in professional societies, receive grants and scholarships*				
4.2.5	*There are academicians and laureates among the faculty*				
4.2.6	*Industrial representatives are involved in the educational process*				
4.3	Number of the faculty with academic degrees meets the AEER criteria				
4.4	Faculty is actively involved in the R & D, activity design and methodological activity				
4.5	Faculty knows and can justify the necessity of their courses in the program curriculum				
4.6	Faculty fluctuation does not exceed 40 %				
5.	**PROFESSIONAL QUALIFICATION**				
5.1.a	Preparation for engineering activity is ensured throughout the whole period of study				
5.1.b	Experience of complex engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project				
5.1.c	*There is a students' portfolio with evidence of educational, research and other activities, participation in various contests and competitions*				
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity				
	Program graduates demonstrate the following learning outcomes:				
5.2	**Professional competencies**				
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of fundamental and advanced knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area				
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex				

	engineering problems using fundamental and advanced knowledge, modern analytical methods				
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations				
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving complex engineering problems in the appropriate professional area; ability to design and conduct experimental investigations, analyse and interpret data using fundamental and advanced knowledge				
5.2.5	**Engineering practice.** Demonstrate the ability to create, choose and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve complex engineering problems in the appropriate professional area with consideration of any existing limitations				
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and complex engineering activity in the appropriate professional area to potential employers				
5.3	**Universal (general) competencies**				
5.3.1	**Management.** Demonstrate the ability to use fundamental and advanced knowledge of management principles to regulate complex engineering activity in the appropriate professional area				
5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of complex engineering activity in the appropriate professional area				
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving complex engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team				
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex				

	engineering activity				
5.3.5	**Social responsibility.** Demonstrate the running complex engineering activity in the appropriate professional area with consideration to:				
5.1.b	- legal and cultural aspects				
	- health protection and safety issues				
	- social responsibility for the professional activity				
	- sustainable development aspects				
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development				
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards				
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents				
5.5.b	Assessment results are used for continuous improvement of the program and the educational process				
6.	**PROGRAM RESOURCES**				
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license				
6.2	Library offering all necessary study materials, including textbooks, professional and reference books, relevant periodicals				
6.3	*There is Internet access for faculty and students to global information resources in engineering including national and international databases of recent research public*				
6.4	Students have sufficient opportunities for self-study and research including open educational resources available on the website of the institution				
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work				
6.6	Financial policy and management of department/ institution is aimed improvement				

	of program resources, continuous professional development of faculty and support staff				
6.7.a	Management of the institution is efficient and conducive to the program implementation				
6.7.b	*There is a modern quality management system at the institution*				
7.	**GRADUATES**				
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for bachelor's programs in the appropriate professional area and a system for employment support and career guidance of graduates				
7.1.b	*There is a system for monitoring the professional certification of program graduates*				
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program				
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives				
7.4	Graduates hold the positions that correspond to their qualification				

NOTES:

Association for Engineering Education of Russia

Accreditation Center

IMPLEMENTATION OF THE SYSTEM OF THE PROGRAM QUALITY MANAGEMENT

Work sheet F-5

(filled out and signed by the evaluation team)

Institution _____

Program _____

! Grades are marked in compliance with enclosed Matrix.

	Section	**Grade (1-5)**
1.	Program objectives	
2.	Stakeholders	
3.	Processes	
4	Learning outcomes assessment	
5.	Learning outcomes	
6.	Quality management system	

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Matrix for implementation of a quality management system of the program

Grade	Program objectives	Stakeholders	Processes	Learning outcomes assessment	Learning outcomes	System of quality management
1	Not well defined	Informal contacts	Few process defined and documented	Carried out on an ad hoc basis	Anecdotal	Not established
2	Generally defined and documented; in full correspondence with the mission of the institution; represent stakeholders' involvement	Involvement in defining objectives, outcomes and their assessment is not clearly defined	Some major processes defined and documented; in full correspondence with the mission of the institution and program objectives	Some outcomes defined and systematically improved; shortcomings comprehended and corrected	Satisfactory outcomes; some evidence of positive prospects of some outcomes	Underdeveloped; partly extended to the program and the department
3	Clearly defined; documented and measurable; in full correspondence with the mission of the institution and stakeholders' needs	Involvement in defining objectives, outcomes and their assessment is clearly defined which assures sustained strategic partnership	Processes for major elements of criteria defined, documented and controlled; in full correspondence with the mission of the institution and stakeholders' needs	Major outcomes defined, systematically assessed and improved; shortcomings foreseen and prevented	Good outcomes; positive prospects of major outcomes; outcomes achievement based on systematic approach	Developed; introduced to the program and the department; determined by the mission and the objectives
4	Clearly defined; documented and measurable; in full correspondence with the mission of the institution and stakeholders' needs; reviewed and updated on a regular basis	Profound involvement in defining objectives, outcomes and their assessment is clearly defined which assures sustained strategic partnership with all groups of stakeholders	Processes for all elements of criteria quantitatively defined, documented and controlled; in full correspondence with the mission of the institution, program objectives and stakeholders' needs	All outcomes defined, the program systematically assessed and improved; some support services involved; causes of shortcomings determined and eradicated	Excellent outcomes; positive prospects of most outcomes; outcomes achievement based on systematic approach	Integrated; introduced to the program, the department and the support services; determined by the mission and the objectives
5	Clearly defined; documented and measurable; in full correspondence with the mission of the institution; easily can be adapted to the stakeholders' needs; reviewed and updated on a regular basis	Profound involvement in defining objectives, outcomes, their assessment and improvement processes is clearly defined which assures sustained strategic partnership with all groups of stakeholders	Processes for all elements of criteria quantitatively defined and controlled; in full correspondence with the mission of the institution, program objectives and stakeholders' needs; serve as a model for other institutions	All outcomes defined, the program systematically assessed and improved; all support services involved; possible causes of shortcomings determined and eradicated	Outcomes meets international standards; sustained results; outcomes achievement based on systematic approach definitely	Sustained, highly integrated; introduced to the program, the department and the institution; determined by the mission and the objectives

Association for Engineering Education of Russia

Accreditation Center

NOTES TO THE REVIEW SHEET OF THE REPRESENTATIVE FROM INDUSTRY

Work sheet F-6 (Bachelor)

(filled out and signed by the industry representative)

Institution _____

Program _____

Representative from industry _____

(Full name)

Date of completing _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"0" – questionable matter

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

! When making the decision on meeting criteria requirements the expert shall make sure all evidences and confirmation certificates are available.

! Number of "0" grades – "questionable matter" shall be minimum.

Criterion number	Criterion content	Final Grade
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**	
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders	
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives	
1.2.b	Program objectives are available for all stakeholders	
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives	
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers	
1.3.2	Learning outcomes are correspond to the readiness of graduates of bachelor's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving,	

	designing, implementing and operating)	
2.	**PROGRAM CONTENT**	
2.6	Engineering courses, cross-disciplinary modules, course projects, hands-on experience and research provide readiness for complex engineering activity in accordance with the objectives of the educational program	
2.7	Studies culminate with a final qualification project that contain research and/or R&D elements	
3.	**EDUCATIONAL PROCESS**	
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*	
4.	**FACULTY**	
4.2.2	*Faculty has experience in corresponding field of industry and is involved in research projects and engineering projects*	
4.2.6	*Industrial representatives are involved in the educational process*	
5.	**PROFESSIONAL QUALIFICATION**	
5.1.b	Experience of complex engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project	
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity	
	Program graduates demonstrate the following learning outcomes:	
5.2	**Professional competencies**	
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of fundamental and advanced knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area	
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex engineering problems using fundamental and advanced knowledge, modern analytical methods	
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations	
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving complex engineering problems in the appropriate professional area; ability to design and conduct experimental investigations, analyse and interpret data using fundamental and advanced knowledge	
5.2.5	**Engineering practice.** Demonstrate the ability to create, choose and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve complex engineering problems in the appropriate professional area with consideration of any existing limitations	
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and complex engineering activity in the appropriate professional area to potential employers	
5.3	**Universal (general) competencies**	
5.3.1	**Management.** Demonstrate the ability to use fundamental and advanced knowledge of management principles to regulate complex engineering activity in the appropriate professional area	
5.3.2	**Communication.** Demonstrate an effective communication with	

	engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of complex engineering activity in the appropriate professional area	
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving complex engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team	
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex engineering activity	
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:	
5.1.b	- legal and cultural aspects	
	- health protection and safety issues	
	- social responsibility for the professional activity	
	- sustainable development aspects	
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development	
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards	
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents	
5.5.b	Assessment results are used for continuous improvement of the program and the educational process	
6.	**PROGRAM RESOURCES**	
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license	
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work	
7.	**GRADUATES**	
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for bachelor's programs in the appropriate professional area and a system for employment support and career guidance of graduates	
7.1.b	*There is a system for monitoring the professional certification of program graduates*	
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program	
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives	
7.4	Graduates hold the positions that correspond to their qualification	

! In case you put « 0 », «-1 », «-2 » provide grounded explanation.

NOTES:

Association for Engineering Education of Russia

Accreditation Center

FINAL PROGRAM EVALUATION WORK SHEET

Work sheet F-7 (Bachelor)

(filled out and signed by the evaluation team)

Institution _____

Program _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

Criterion number	Criterion content	Final Grade
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**	
1.1.	Educational program has:	
1.1.1.	Program objectives are clearly defined and documented	
1.1.1.a	Program objectives are in full correspondence with the Federal State Educational Standards (educational standards of the institution)	
1.1.1.b	Program objectives are in full correspondence with the mission of the educational institution	
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders	
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives	
1.2.a	Program objectives are made public	
1.2.b	Program objectives are available for all stakeholders	
1.2.c	Program objectives are shared by each faculty member involved in the program	
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives	
1.3.1.	Program outcomes are stated as expected competencies of graduates	
1.3.1.a	Program outcomes are in full correspondence with the Federal State Educational Standards (educational standards of the institution)	
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers	
1.3.1.c	Program outcomes are in full correspondence with the AEER Criterion 5	
1.3.2	Learning outcomes are correspond to the readiness of graduates of bachelor's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving, designing, implementing and operating)	
2.	**PROGRAM CONTENT**	

2.1	The educational program has the value of at least 240 ECTS credits	
2.2.a	Program curriculum corresponds to the program objectives and ensure achievement of the learning objectives by all program graduates	
2.2.b	Program course (module) syllabus are correspond to the program objectives and ensure achievement of the learning objectives by all program graduates	
2.3.a	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide integration of professional and universal (general) competencies	
2.3.b	Program curriculum includes disciplines and cross-disciplinary modules (courses) that include personal attributes and interpersonal skills	
2.3.c	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide experience in design of technical objects, systems and technological processes	
2.4	Program curriculum includes basic and advanced courses in natural sciences and mathematics to ensure learning of fundamentals and serve the basis for obtaining required professional competencies by bachelors	
2.4.1	The courses in natural sciences and mathematics have the value of at least 60 ECTS credits including at least 20 ECTS credits for advanced courses	
2.4.2	Studies in natural sciences provide knowledge and understanding of basic phenomena and laws of nature and the ability to use them in solving complex engineering problems	
2.4.3	Studies in mathematics provide an ability to use mathematical methods in solving complex engineering problems	
2.5	Studies in humanities, social sciences and economics provide the basis for development of competencies in:	
	solving management	
	social	
	economic	
	legal	
	ethical	
	labour safety	
	health protection	
	sustainable development	
2.5.1	Studies in humanities and economics meets the requirements of the AEER criteria	
2.5.2	Studies in humanities, social sciences and economics contribute to development of competencies in the field of communication including the ability to deliver information and ideas, define problems and find their possible solutions	
2.6	Engineering courses, cross-disciplinary modules, course projects, hands-on experience and research provide readiness for complex engineering activity in accordance with the objectives of the educational program	
2.6.1	Engineering and cross-disciplinary courses meets the requirements of the AEER criteria	
2.6.2	Studies in engineering corresponds with the level of training in mathematics and natural sciences and ensure application of the acquired knowledge in engineering practice	
2.6.3.a	Studies in engineering design contributes to the development of creative thinking and ability to solve complex engineering problems	
2.6.3.b	Development of project objectives and evaluation criteria, analysis and synthesis of engineering solutions is an essential element in engineering design	

2.6.4	Internships (of at least 12 weeks) is an essential element of the educational program and may result in obtaining qualification for blue-collar jobs	
2.7	Studies culminate with a final qualification project that contain research and/or R&D elements	
3.	**EDUCATIONAL PROCESS**	
3.1	Students admitted into the program meets the requirements of the AEER criteria	
3.2.a	Students' level of knowledge in natural sciences and mathematics is sufficient	
3.2.b	There is a system of academic adaptation for the students with an insufficient background knowledge	
3.3.a	Study process ensures outcomes achievement by all students	
3.3.b	There are a system of on-going evaluation of students' progress and an efficient feedback mechanism for continuous improvement of the program content and educational technologies	
3.4	*Active learning and students' self-study from open educational resources, including the resources published on the website of the institution, are applied*	
3.5	*The existence of student-centred learning environment and participation of students in the development of individual learning paths is demonstrated*	
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*	
4.	**FACULTY**	
4.1	Faculty is competent in all areas of the curriculum	
4.2	Faculty is highly qualified	
4.2.1.a	Faculty has corresponding fundamental education	
4.2.1.b	Faculty regularly improves its qualification through additional education, internships, etc. and increase pedagogical excellence on a regular basis	
4.2.2	*Faculty has experience in corresponding field of industry and is involved in research projects and engineering projects*	
4.2.3	Faculty is involved in improvement of the whole program and individual courses	
4.2.4	*Faculty holds membership in professional societies, receive grants and scholarships*	
4.2.5	*There are academicians and laureates among the faculty*	
4.2.6	*Industrial representatives are involved in the educational process*	
4.3	Number of the faculty with academic degrees meets the AEER criteria	
4.4	Faculty is actively involved in the R & D, activity design and methodological activity	
4.5	Faculty knows and can justify the necessity of their courses in the program curriculum	
4.6	Faculty fluctuation does not exceed 40 %	
5.	**PROFESSIONAL QUALIFICATION**	
5.1.a	Preparation for engineering activity is ensured throughout the whole period of study	
5.1.b	Experience of complex engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project	
5.1.c	*There is a students' portfolio with evidence of educational, research and other activities, participation in various contests and competitions*	
5.1.d	All graduates achieve the learning outcomes that are aligned to professional	

	standards and required for professional activity	
	Program graduates demonstrate the following learning outcomes:	
5.2	**Professional competencies**	
5.2.1	**Application of fundamental knowledge.** Demonstrate application of fundamental and advanced knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area	
5.2.2	**Engineering analysis.** Demonstrate ability to formulate and solve complex engineering problems using fundamental and advanced knowledge, modern analytical methods	
5.2.3	**Engineering design.** Demonstrate ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations	
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving complex engineering problems in the appropriate professional area; ability to design and conduct experimental investigations, analyse and interpret data using fundamental and advanced knowledge	
5.2.5	**Engineering practice.** Demonstrate the ability to create, choose and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve complex engineering problems in the appropriate professional area with consideration of any existing limitations	
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and complex engineering activity in the appropriate professional area to potential employers	
5.3	**Universal (general) competencies**	
5.3.1	**Management.** Demonstrate the ability to use fundamental and advanced knowledge of management principles to regulate complex engineering activity in the appropriate professional area	
5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of complex engineering activity in the appropriate professional area	
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving complex engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team	
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex engineering activity	
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:	
5.1.b	- legal and cultural aspects	
	- health protection and safety issues	
	- social responsibility for the professional activity	
	- sustainable development aspects	
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development	
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards	

5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents	
5.5.b	Assessment results are used for continuous improvement of the program and the educational process.	
6.	**PROGRAM RESOURCES**	
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license	
6.2	Library offering all necessary study materials, including textbooks, professional and reference books, relevant periodicals	
6.3	*There is Internet access for faculty and students to global information resources in engineering including national and international databases of recent research public*	
6.4	Students have sufficient opportunities for self-study and research including open educational resources available on the website of the institution	
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work	
6.6	Financial policy and management of department/ institution is aimed improvement of program resources, continuous professional development of faculty and support staff	
6.7.a	Management of the institution is efficient and conducive to the program implementation	
6.7.b	*There is a modern quality management system at the institution*	
7.	**GRADUATES**	
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for bachelor's programs in the appropriate professional area and a system for employment support and career guidance of graduates	
7.1.b	*There is a system for monitoring the professional certification of program graduates*	
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program	
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives	
7.4	Graduates hold the positions that correspond to their qualification	

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Association for Engineering Education of Russia

Accreditation Center

PRELIMINARY EVALUATION OF PROGRAM CORRESPONDENCE WITH THE AEER CRITERIA BASED ON THE SELF-STUDY DOCUMENTATION

Work sheet F-1 (Specialist)

(filled out and signed by each program evaluator prior to on-site visit)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

AEER CRITERIA	Grade
CRITERION 1. **Program objectives and learning outcomes**	
CRITERION 2. **Program content**	
CRITERION 3. **Educational process**	
CRITERION 4. **Faculty**	
CRITERION 5. **Professional qualification**	
CRITERION 6. **Program resources**	
CRITERION 7. **Graduates**	

Grade rating:

Fully meets a criterion	"+"
Questionable matter	"0"
Program has weaknesses	"-1"
Program has deficiencies	"-2"

If an expert considers that the reviewed program has deficiencies (grade "-2"), he/she should provide a grounded report on non-compliance of the program with the AEER criteria and impossibility of the accreditation at present.

_____

Signature

Association for Engineering Education of Russia

Accreditation Center

CURRICULUM ANALYSIS

Work sheet F-2 (Specialist)

(filled out and signed by each program evaluator)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

Please complete the first column of the Table 1 prior to the on-site visit

Table 1

Analysis of curriculum' categories

Curriculum' category	Value, ECTS[2]		
	Based on self-study report (Table "Courses of the Curriculum")	**Based on on-site visit**	**Minimum in compliance with the AEER requirements**
Natural sciences and mathematics (NSM)			**60**
Advanced NSM courses			20
General professional and special disciplines (GPSD)			**150**
Advanced GPSD courses			60
Humanities and socioeconomic studies			**30***
Internships and final qualification project			
Other			-
Total			**300**

[2] ECTS - European Credit Transfer System

* recommended value

Work sheet F-2 (continued)

Table 2

Implementation of the AEER requirements for engineering design

Are the curriculum' requirements met in the following sections?	**Yes**	**No**
Design experience is acquired during the implementation of course works and projects		
Major design experience is acquired during the implementation of final qualification project		
Course works and projects prepared by students cover:		
legal and cultural aspects		
health protection and safety issues		
social responsibility for the professional activity		
sustainable development aspects		
Final qualification project covers the issues that contribute to the development of following competencies:		
managerial		
social		
economic		
legal		
ethical		
labour safety		
health protection		
sustainable development		

* Use the mark "✓" (via copy/paste functions) to choose the answer completing the table.

! This table is compiled on the basis of self-study report and analysis of course projects and final qualification works submitted by the university during the on-site visit.

! Identify and indicate <u>when exactly</u> (during implementation of course projects and final qualification project) do students demonstrate acquired professional skills and competencies covering the above-mentioned aspects.

Association for Engineering Education of Russia

Accreditation Center

ACADEMIC CREDENTIALS ANALYSIS

Work sheet F-3

(*filled out and signed by the evaluation team)*

Institution _____

Program _____

Fill out the table with the data of transcripts of two graduates with academic progress above average, two graduates with average academic progress and two graduates with poor academic progress.

Curriculum' category	**Grade point average per curriculum' category**					
	"above average"		**"average"**		**"poor"**	
Natural sciences and mathematics						
General professional and special disciplines						
Humanities and socioeconomic studies						
Other						

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Association for Engineering Education of Russia

Accreditation Center

REVIEW SHEET OF THE PROGRAM EVALUATOR

Work sheet F-4 (Specialist)

(filled out and signed by each program evaluator)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"0" – questionable matter

"-1" – program has weaknesses

"-2" – program has deficiencies

! The column Day 1 is omitted because the members of the evaluation team do not visit the institution this day.

! When making the decision on meeting criteria requirements the expert shall make sure all evidences and confirmation certificates are available.

! By the end of the on-site visit all questionable matters shall be clarified, and column "Day 4" shall not contain questionable indicators, i.e. "0" grade.

Criterion number	Criterion content	Pre-visit estimate	Day 2	Day 3	Day 4
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**				
1.1.	Educational program has:				
1.1.1.	Program objectives are clearly defined and documented				
1.1.1.a	Program objectives are in full correspondence with the Federal State Educational Standards (educational standards of the institution)				
1.1.1.b	Program objectives are in full correspondence				

	with the mission of the educational institution				
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders				
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives				
1.2.a	Program objectives are made public				
1.2.b	Program objectives are available for all stakeholders				
1.2.c	Program objectives are shared by each faculty member involved in the program				
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives				
1.3.1.	Program outcomes are stated as expected competencies of graduates				
1.3.1.a	Program outcomes are in full correspondence with the Federal State Educational Standards (educational standards of the institution)				
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers				
1.3.1.c	Program outcomes are in full correspondence with the AEER Criterion 5				
1.3.2	Learning outcomes are correspond to the readiness of graduates of specialist's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving, designing, implementing and operating)				
2.	**PROGRAM CONTENT**				
2.1	The educational program has the value of at least 300 ECTS credits				
2.2.a	Program curriculum corresponds to the program objectives and ensure achievement of the learning objectives by all program graduates				
2.2.b	Program course (module) syllabi are correspond to the program objectives and ensure achievement of the learning objectives by all program graduates				
2.3.a	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide integration of professional and universal (general) competencies				
2.3.b	Program curriculum includes disciplines and cross-disciplinary modules (courses) that include personal attributes and interpersonal skills				

2.3.c	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide experience in design of technical objects, systems and technological processes				
2.4	Program curriculum include basic and advanced courses in natural sciences and mathematics to ensure learning of fundamentals and serve the basis for obtaining required professional competencies by specialists				
2.4.1	The courses in natural sciences and mathematics have the value of at least 60 ECTS credits including at least 20 ECTS credits for advanced courses				
2.4.2	Studies in natural sciences provide knowledge and understanding of basic phenomena and laws of nature and the ability to use them in solving complex engineering problems				
2.4.3	Studies in mathematics provide an ability to use mathematical methods in solving complex engineering problems				
2.5	Studies in humanities, social sciences and economics provide the basis for development of competencies in:				
	solving management				
	social				
	economic				
	legal				
	ethical				
	labour safety				
	health protection				
	sustainable development				
2.5.1	Studies in humanities and economics meets the requirements of the AEER criteria				
2.5.2	Studies in humanities, social sciences and economics contribute to development of competencies in the field of communication including the ability to deliver information and ideas, define problems and find their possible solutions				
2.6	Engineering courses, cross-disciplinary modules, course projects, hands-on experience and research provide readiness for complex engineering activity in accordance with the objectives of the educational program				
2.6.1	Engineering and cross-disciplinary courses meets the requirements of the AEER criteria				
2.6.2	Studies in engineering corresponds with the level of training in mathematics and natural sciences and ensure application of the				

	acquired knowledge in engineering practice				
2.6.3.a	Studies in engineering design contributes to the development of creative thinking and ability to solve complex engineering problems				
2.6.3.b	Development of project objectives and evaluation criteria, analysis and synthesis of engineering solutions is an essential element in engineering design				
2.6.4	Internships (of at least 16 weeks) is an essential element of the educational program and may result in obtaining qualification for blue-collar jobs				
2.7	Studies culminate with a final qualification project that contain research and/or R&D elements				
3.	**EDUCATIONAL PROCESS**				
3.1	Students admitted into the program meets the requirements of the AEER criteria				
3.2.a	Students' level of knowledge in natural sciences and mathematics is sufficient				
3.2.b	There is a system of academic adaptation for the students with an insufficient background knowledge				
3.3.a	Study process ensures outcomes achievement by all students				
3.3.b	There are a system of on-going evaluation of students' progress and an efficient feedback mechanism for continuous improvement of the program content and educational technologies				
3.4	*Active learning and students' self-study from open educational resources, including the resources published on the website of the institution, are applied*				
3.5	*The existence of student-centred learning environment and participation of students in the development of individual learning paths is demonstrated*				
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*				
4.	**FACULTY**				
4.1	Faculty is competent in all areas of the curriculum				
4.2	Faculty is highly qualified				

4.2.1.a	Faculty has corresponding fundamental education				
4.2.1.b	Faculty regularly improves its qualification through additional education, internships, etc. and increase pedagogical excellence on a regular basis				
4.2.2	*Faculty has experience in corresponding field of industry and is involved in research projects and engineering projects*				
4.2.3	Faculty is involved in improvement of the whole program and individual courses				
4.2.4	*Faculty holds membership in professional societies, receive grants and scholarships*				
4.2.5	*There are academicians and laureates among the faculty*				
4.2.6	*Industrial representatives are involved in the educational process*				
4.3	Number of the faculty with academic degrees meets the AEER criteria				
4.4	Faculty is actively involved in the R & D, activity design and methodological activity				
4.5	Faculty knows and can justify the necessity of their courses in the program curriculum				
4.6	Faculty fluctuation does not exceed 40 %				
5.	**PROFESSIONAL QUALIFICATION**				
5.1.a	Preparation for engineering activity is ensured throughout the whole period of study				
5.1.b	Experience of complex engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project				
5.1.c	*There is a students' portfolio with evidence of educational, research and other activities, participation in various contests and competitions*				
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity				
	Program graduates demonstrate the following learning outcomes:				
5.2	**Professional competencies**				
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of fundamental and advanced knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area				
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex				

	engineering problems using fundamental and special knowledge, modern analytical methods				
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations				
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving complex engineering problems in the appropriate professional area; ability to design and conduct experimental investigations, analyse and interpret data using fundamental and special knowledge				
5.2.5	**Engineering practice.** Demonstrate the ability to create, choose and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve complex engineering problems in the appropriate professional area with consideration of any existing limitations				
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and complex engineering activity in the appropriate professional area to potential employers				
5.3	**Universal (general) competencies**				
5.3.1	**Management.** Demonstrate the ability to use fundamental and special knowledge of management principles to regulate complex engineering activity in the appropriate professional area				
5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of complex engineering activity in the appropriate professional area				
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving complex engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team				
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex				

	engineering activity				
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:				
5.1.b	- legal and cultural aspects				
	- health protection and safety issues				
	- social responsibility for the professional activity				
	- sustainable development aspects				
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development				
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards				
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents.				
5.5.b	Assessment results are used for continuous improvement of the program and the educational process.				
6.	**PROGRAM RESOURCES**				
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license				
6.2	Library offering all necessary study materials, including textbooks, professional and reference books, relevant periodicals				
6.3	*There is Internet access for faculty and students to global information resources in engineering including national and international databases of recent research public*				
6.4	Students have sufficient opportunities for self-study and research including open educational resources available on the website of the institution				
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work				
6.6	Financial policy and management of department/ institution is aimed improvement of program resources, continuous professional				

	development of faculty and support staff				
6.7.a	Management of the institution is efficient and conducive to the program implementation				
6.7.b	*There is a modern quality management system at the institution*				
7.	**GRADUATES**				
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for specialist's programs in the appropriate professional area and a system for employment support and career guidance of graduates				
7.1.b	*There is a system for monitoring the professional certification of program graduates*				
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program				
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives				
7.4	Graduates hold the positions that correspond to their qualification				

NOTES:

Association for Engineering Education of Russia

Accreditation Center

IMPLEMENTATION OF THE SYSTEM OF THE PROGRAM QUALITY MANAGEMENT

Work sheet F-5

(filled out and signed by the evaluation team)

Institution _____

Program _____

! Grades are marked in compliance with enclosed Matrix.

	Section	Grade (1-5)
1.	Program objectives	
2.	Stakeholders	
3.	Processes	
4	Learning outcomes assessment	
5.	Learning outcomes	
6.	Quality management system	

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Matrix for implementation of a quality management system of the program

Grade	Program objectives	Stakeholders	Processes	Learning outcomes assessment	Learning outcomes	System of quality management
1	Not well defined	Informal contacts	Few process defined and documented	Carried out on an ad hoc basis	Anecdotal	Not established
2	Generally defined and documented; in full correspondence with the mission of the institution; represent stakeholders' involvement	Involvement in defining objectives, outcomes and their assessment is not clearly defined	Some major processes defined and documented; in full correspondence with the mission of the institution and program objectives	Some outcomes defined and systematically improved; shortcomings comprehended and corrected	Satisfactory outcomes; some evidence of positive prospects of some outcomes	Underdeveloped; partly extended to the program and the department
3	Clearly defined; documented and measurable; in full correspondence with the mission of the institution and stakeholders' needs	Involvement in defining objectives, outcomes and their assessment is clearly defined which assures sustained strategic partnership	Processes for major elements of criteria defined, documented and controlled; in full correspondence with the mission of the institution and stakeholders' needs	Major outcomes defined, systematically assessed and improved; shortcomings foreseen and prevented	Good outcomes; positive prospects of major outcomes; outcomes achievement based on systematic approach	Developed; introduced to the program and the department; determined by the mission and the objectives
4	Clearly defined; documented and measurable; in full correspondence with the mission of the institution and stakeholders' needs; reviewed and updated on a regular basis	Profound involvement in defining objectives, outcomes and their assessment is clearly defined which assures sustained strategic partnership with all groups of stakeholders	Processes for all elements of criteria quantitatively defined, documented and controlled; in full correspondence with the mission of the institution, program objectives and stakeholders' needs	All outcomes defined, the program systematically assessed and improved; some support services involved; causes of shortcomings determined and eradicated	Excellent outcomes; positive prospects of most outcomes; outcomes achievement based on systematic approach	Integrated; introduced to the program, the department and the support services; determined by the mission and the objectives
5	Clearly defined; documented and measurable; in full correspondence with the mission of the institution; easily can be adapted to the stakeholders' needs; reviewed and updated on a regular basis	Profound involvement in defining objectives, outcomes, their assessment and improvement processes is clearly defined which assures sustained strategic partnership with all groups of stakeholders	Processes for all elements of criteria quantitatively defined and controlled; in full correspondence with the mission of the institution, program objectives and stakeholders' needs; serve as a model for other institutions	All outcomes defined, the program systematically assessed and improved; all support services involved; possible causes of shortcomings determined and eradicated	Outcomes meets international standards; sustained results; outcomes achievement based on systematic approach definitely	Sustained, highly integrated; introduced to the program, the department and the institution; determined by the mission and the objectives

Association for Engineering Education of Russia

Accreditation Center

NOTES TO THE REVIEW SHEET OF THE REPRESENTATIVE FROM INDUSTRY

Work sheet F-6 (Specialist)

(filled out and signed by the industry representative)

Institution _____

Program _____

Representative from industry _____

(Full name)

Date of completing _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"0" – questionable matter

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

! When making the decision on meeting criteria requirements the expert shall make sure all evidences and confirmation certificates are available.

! Number of "0" grades – "questionable matter" shall be minimum.

Criterion number	Criterion content	Final Grade
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**	
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders	
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives	
1.2.b	Program objectives are available for all stakeholders	
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives	
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers	
1.3.2	Learning outcomes are correspond to the readiness of graduates of specialist's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving,	

	designing, implementing and operating)	
2.	**PROGRAM CONTENT**	
2.6	Engineering courses, cross-disciplinary modules, course projects, work-based training and research provide readiness for complex engineering activity in accordance with the objectives of the educational program	
2.7	Studies culminate with a final qualification project that contain research and/or R&D elements	
3.	**EDUCATIONAL PROCESS**	
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*	
4.	**FACULTY**	
4.2.2	*Faculty has experience in corresponding field of industry and is involved in research projects and engineering projects*	
4.2.6	*Industrial representatives are involved in the educational process*	
5.	**PROFESSIONAL QUALIFICATION**	
5.1.b	Experience of complex engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project	
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity	
	Program graduates demonstrate the following learning outcomes:	
5.2	**Professional competencies**	
5.2.1	**Application of fundamental knowledge**. Demonstrate the application of fundamental and special knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area	
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex engineering problems using fundamental and special knowledge, modern analytical methods	
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations	
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving complex engineering problems in the appropriate professional area; ability to design and conduct experimental investigations, analyse and interpret data using fundamental and special knowledge	
5.2.5	**Engineering practice.** Demonstrate the ability to create, choose and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve complex engineering problems in the appropriate professional area with consideration of any existing limitations	
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and complex engineering activity in the appropriate professional area to potential employers	
5.3	**Universal (general) competencies**	
5.3.1	**Management.** Demonstrate the ability to use fundamental and special knowledge of management principles to regulate complex engineering activity in the appropriate professional area	
5.3.2	**Communication.** Demonstrate an effective communication with	

	engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of complex engineering activity in the appropriate professional area	
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving complex engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team	
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex engineering activity	
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:	
5.1.b	- legal and cultural aspects	
	- health protection and safety issues	
	- social responsibility for the professional activity	
	- sustainable development aspects	
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development	
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards	
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents	
5.5.b	Assessment results are used for continuous improvement of the program and the educational process	
6.	**PROGRAM RESOURCES**	
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license	
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work	
7.	**GRADUATES**	
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for specialist's programs in the appropriate professional area and a system for employment support and career guidance of graduates	
7.1.b	*There is a system for monitoring the professional certification of program graduates*	
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program	
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives	
7.4	Graduates hold the positions that correspond to their qualification	

! In case you put « 0 », «-1 », «-2 » provide grounded explanation.

NOTES:

Association for Engineering Education of Russia

Accreditation Center

FINAL PROGRAM EVALUATION WORK SHEET

Work sheet F-7 (Specialist)

(filled out and signed by the evaluation team)

Institution _____

Program _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

Criterion number	Criterion content	Final Grade
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**	
1.1.	Educational program has:	
1.1.1.	Program objectives are clearly defined and documented	
1.1.1.a	Program objectives are in full correspondence with the Federal State Educational Standards (educational standards of the institution)	
1.1.1.b	Program objectives are in full correspondence with the mission of the educational institution	
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders	
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives	
1.2.a	Program objectives are made public	
1.2.b	Program objectives are available for all stakeholders	
1.2.c	Program objectives are shared by each faculty member involved in the program	
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives	
1.3.1.	Program outcomes are stated as expected competencies of graduates	
1.3.1.a	Program outcomes are in full correspondence with the Federal State Educational Standards (educational standards of the institution)	
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers	
1.3.1.c	Program outcomes are in full correspondence with the AEER Criterion 5	
1.3.2	Learning outcomes are correspond to the readiness of graduates of specialist's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving, designing, implementing and operating)	
2.	**PROGRAM CONTENT**	

2.1	The educational program has the value of at least 300 ECTS credits	
2.2.a	Program curriculum corresponds to the program objectives and ensure achievement of the learning objectives by all program graduates	
2.2.b	Program course (module) syllabi are correspond to the program objectives and ensure achievement of the learning objectives by all program graduates	
2.3.a	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide integration of professional and universal (general) competencies	
2.3.b	Program curriculum includes disciplines and cross-disciplinary modules (courses) that include personal attributes and interpersonal skills	
2.3.c	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide experience in design of technical objects, systems and technological processes	
2.4	Program curriculum include basic and advanced courses in natural sciences and mathematics to ensure learning of fundamentals and serve the basis for obtaining required professional competencies by specialists	
2.4.1	The courses in natural sciences and mathematics have the value of at least 60 ECTS credits including at least 20 ECTS credits for advanced courses	
2.4.2	Studies in natural sciences provide knowledge and understanding of basic phenomena and laws of nature and the ability to use them in solving complex engineering problems	
2.4.3	Studies in mathematics provide an ability to use mathematical methods in solving complex engineering problems	
2.5	Studies in humanities, social sciences and economics provide the basis for development of competencies in:	
	solving management	
	social	
	economic	
	legal	
	ethical	
	labour safety	
	health protection	
	sustainable development	
2.5.1	Studies in humanities and economics meets the requirements of the AEER criteria	
2.5.2	Studies in humanities, social sciences and economics contribute to development of competencies in the field of communication including the ability to deliver information and ideas, define problems and find their possible solutions	
2.6	Engineering courses, cross-disciplinary modules, course projects, hands-on experience and research provide readiness for complex engineering activity in accordance with the objectives of the educational program	
2.6.1	Engineering and cross-disciplinary courses meets the requirements of the AEER criteria	
2.6.2	Studies in engineering corresponds with the level of training in mathematics and natural sciences and ensure application of the acquired knowledge in engineering practice	
2.6.3.a	Studies in engineering design contributes to the development of creative thinking and ability to solve complex engineering problems	
2.6.3.b	Development of project objectives and evaluation criteria, analysis and synthesis of engineering solutions is an essential element in engineering design	
2.6.4	Internships (of at least 16 weeks) is an essential element of the educational	

	program and may result in obtaining qualification for blue-collar jobs	
2.7	Studies culminate with a final qualification project that contain research and/or R&D elements	
3.	**EDUCATIONAL PROCESS**	
3.1	Students admitted into the program meets the requirements of the AEER criteria	
3.2.a	Students' level of knowledge in natural sciences and mathematics is sufficient	
3.2.b	There is a system of academic adaptation for the students with an insufficient background knowledge	
3.3.a	Study process ensures outcomes achievement by all students	
3.3.b	There are a system of on-going evaluation of students' progress and an efficient feedback mechanism for continuous improvement of the program content and educational technologies	
3.4	*Active learning and students' self-study from open educational resources, including the resources published on the website of the institution, are applied*	
3.5	*The existence of student-centred learning environment and participation of students in the development of individual learning paths is demonstrated*	
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*	
4.	**FACULTY**	
4.1	Faculty is competent in all areas of the curriculum	
4.2	Faculty is highly qualified	
4.2.1.a	Faculty has corresponding fundamental education	
4.2.1.b	Faculty regularly improves its qualification through additional education, internships, etc. and increase pedagogical excellence on a regular basis	
4.2.2	*Faculty has experience in corresponding field of industry and is involved in research projects and engineering projects*	
4.2.3	Faculty is involved in improvement of the whole program and individual courses	
4.2.4	*Faculty holds membership in professional societies, receive grants and scholarships*	
4.2.5	*There are academicians and laureates among the faculty*	
4.2.6	*Industrial representatives are involved in the educational process*	
4.3	Number of the faculty with academic degrees meets the AEER criteria	
4.4	Faculty is actively involved in the R & D, activity design and methodological activity	
4.5	Faculty knows and can justify the necessity of their courses in the program curriculum	
4.6	Faculty fluctuation does not exceed 40 %	
5.	**PROFESSIONAL QUALIFICATION**	
5.1.a	Preparation for engineering activity is ensured throughout the whole period of study	
5.1.b	Experience of complex engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project	
5.1.c	*There is students' portfolio with evidence of educational, research and other activities, participation in various contests and competitions*	
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity	

	Program graduates demonstrate the following learning outcomes:	
5.2	**Professional competencies**	
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of fundamental and special knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area	
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex engineering problems using fundamental and special knowledge, modern analytical methods	
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations	
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving complex engineering problems in the appropriate professional area; ability to design and conduct experimental investigations, analyse and interpret data using fundamental and special knowledge	
5.2.5	**Engineering practice.** Demonstrate the ability to create, choose and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve complex engineering problems in the appropriate professional area with consideration of any existing limitations	
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and complex engineering activity in the appropriate professional area to potential employers	
5.3	**Universal (general) competencies**	
5.3.1	**Management.** Demonstrate the ability to use fundamental and special knowledge of management principles to regulate complex engineering activity in the appropriate professional area	
5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of complex engineering activity in the appropriate professional area	
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving complex engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team	
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex engineering activity	
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:	
5.1.b	- legal and cultural aspects	
	- health protection and safety issues aspects	
	- social responsibility for the professional activity	
	- sustainable development aspects	
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development	
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards	
5.5.a	Institution has a system for assessment of learning outcomes in the	

	program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents	
5.5.b	Assessment results are used for continuous improvement of the program and the educational process.	
6.	**PROGRAM RESOURCES**	
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license	
6.2	Library offering all necessary study materials, including textbooks, professional and reference books, relevant periodicals	
6.3	*There is Internet access for faculty and students to global information resources in engineering including national and international databases of recent research public*	
6.4	Students have sufficient opportunities for self-study and research including open educational resources available on the website of the institution	
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work	
6.6	Financial policy and management of department/ institution is aimed improvement of program resources, continuous professional development of faculty and support staff	
6.7.a	Management of the institution is efficient and conducive to the program implementation	
6.7.b	*There is a modern quality management system at the institution*	
7.	**GRADUATES**	
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for specialist's programs in the appropriate professional area and a system for employment support and career guidance of graduates	
7.1.b	*There is a system for monitoring the professional certification of program graduates*	
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program	
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives	
7.4	Graduates hold the positions that correspond to their qualification	

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Association for Engineering Education of Russia

Accreditation Center

PRELIMINARY EVALUATION OF PROGRAM CORRESPONDENCE WITH THE AEER CRITERIA BASED ON THE SELF-STUDY DOCUMENTATION

Work sheet F-1 (Master)

(filled out and signed by each program evaluator prior to on-site visit)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

AEER CRITERIA	Grade
CRITERION 1. **Program objectives and learning outcomes**	
CRITERION 2. **Program content**	
CRITERION 3. **Educational process**	
CRITERION 4. **Faculty**	
CRITERION 5. **Professional qualification**	
CRITERION 6. **Program resources**	
CRITERION 7. **Graduates**	

Grade rating:

Fully meets a criterion	"+"
Questionable matter	"0"
Program has weaknesses	"-1"
Program has deficiencies	"-2"

If an expert considers that the reviewed program has deficiencies (grade "-2"), he/she should provide a grounded report on non-compliance of the program with the AEER criteria and impossibility of the accreditation at present.

_____

Signature

Association for Engineering Education of Russia

Accreditation Center

CURRICULUM ANALYSIS

Work sheet F-2 (Master)

(filled out and signed by each program evaluator)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

Please complete the first column of the Table 1 prior to the on-site visit

Table 1

Analysis of curriculum' categories

Curriculum' category	Value, ECTS[3]		
	Based on self-study report (Table "Courses of the Curriculum")	**Based on on-site visit**	**Minimum in compliance with the AEER requirements**
Natural sciences and mathematics (NSM)			
Advanced NSM courses			12-15*
General professional and special disciplines (GPSD)			
Advanced GPSD courses			30*
Humanities and socioeconomic studies			-
Internships and final qualification project			50
Other			-
Total			**120**

[3] ECTS - European Credit Transfer System

* recommended value

Table 2

Implementation of the AEER requirements for engineering design

Are the curriculum' requirements met in the following sections?	**Yes**	**No**
Design experience is acquired during the implementation of course works and projects		
Major design experience is acquired during the implementation of final qualification project		
Course works and projects prepared by students cover:		
legal and cultural aspects		
health protection and safety issues		
social responsibility for the professional activity		
sustainable development aspects		
Final qualification project covers the issues that contribute to the development of following competencies:		
managerial		
social		
economic		
legal		
ethical		
labour safety		
health protection		

* Use the mark "✓" (via copy/paste functions) to choose the answer completing the table.

! *This table is compiled on the basis of self-study report and analysis of course projects and final qualification works submitted by the university during the on-site visit.*

! *Identify and indicate <u>when exactly</u> (during implementation of course projects and final qualification project) do students demonstrate acquired professional skills and competencies covering the above mentioned aspects.*

Association for Engineering Education of Russia

Accreditation Center

ACADEMIC CREDENTIALS ANALYSIS

Work sheet F-3

(*filled out and signed by the evaluation team)*

Institution _____

Program _____

Fill out the table with the data of transcripts of two graduates with academic progress above average, two graduates with average academic progress and two graduates with poor academic progress.

Curriculum' category	**Grade point average per curriculum' category**					
	"above average"		**"average"**		**"poor"**	
Natural sciences and mathematics						
General professional and special disciplines						
Humanities and socioeconomic studies						
Other						

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Association for Engineering Education of Russia

Accreditation Center

REVIEW SHEET OF THE PROGRAM EVALUATOR

Work sheet F-4 (Master)

(filled out and signed by each program evaluator)

Institution _____

Program _____

Program evaluator _____

(Full name)

Date of completing _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"0" – questionable matter

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

! The column Day 1 is omitted because the members of the evaluation team do not visit the institution this day.

! When making the decision on meeting criteria requirements the expert shall make sure all evidences and confirmation certificates are available.

! By the end of the on-site visit all questionable matters shall be clarified, and column "Day 4" shall not contain questionable indicators, i.e. "0" grade.

Criterion number	Criterion content	Pre-visit estimate	Day 2	Day 3	Day 4
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**				
1.1.	Educational program has:				
1.1.1.	Program objectives are clearly defined and documented				
1.1.1.a	Program objectives are in full correspondence with the Federal State Educational Standards (educational standards of the institution)				
1.1.1.b	Program objectives are in full correspondence with the mission of the educational institution				
1.1.1.c	Program objectives are in full correspondence				

	with the needs of employers and other program stakeholders				
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives				
1.2.a	Program objectives are made public				
1.2.b	Program objectives are available for all stakeholders				
1.2.c	Program objectives are shared by each faculty member involved in the program				
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives				
1.3.1.	Program outcomes are stated as expected competencies of graduates				
1.3.1.a	Program outcomes are in full correspondence with the Federal State Educational Standards (educational standards of the institution)				
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers				
1.3.1.c	Program outcomes are in full correspondence with the AEER Criterion 5				
1.3.2	Learning outcomes are correspond to the readiness of graduates of master's programs for innovative engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving, designing, implementing and operating)				
2.	**PROGRAM CONTENT**				
2.1	The educational program has the value of at least 120 ECTS credits				
2.2.a	Program curriculum corresponds to the program objectives and ensure achievement of the learning objectives by all program graduates				
2.2.b	Program course (module) syllabus are correspond to the program objectives and ensure achievement of the learning objectives by all program graduates				
2.3.a	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide integration of professional and universal (general) competencies				
2.3.b	Program curriculum includes disciplines and cross-disciplinary modules (courses) that include personal attributes and interpersonal skills				
2.3.c	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide experience in design of technical				

	objects, systems and technological processes				
2.4	Program curriculum includes courses in natural sciences and mathematics to ensure advanced learning of fundamentals and serve the basis for obtaining required professional competencies by engineering masters				
2.4.1	The courses in natural sciences and mathematics have the value comprise 12-15 ECTS credits ECTS credits for advanced courses				
2.4.2	Studies in natural sciences provide deep knowledge and understanding of phenomena and laws of nature and the ability to use them in solving innovative engineering problems				
2.4.3	Studies in mathematics provide an ability to use mathematical methods and complex models in solving innovative engineering problems				
2.5	Studies in humanities, social sciences and economics provide the basis for development of advanced competencies in:				
	communication				
	leadership				
	project design				
	financial management				
	labour safety				
	health protection				
	sustainable development				
2.6	Engineering courses, cross-disciplinary modules, design projects, hands-on experience and research provide readiness for innovative engineering activity in accordance with the objectives of the educational program				
2.6.1	Engineering and cross-disciplinary courses meets the requirements of the AEER criteria				
2.6.2	Studies in engineering corresponds with the level of training in mathematics and natural sciences and ensure application of the acquired knowledge in engineering practice				
2.7	Educational program include hands-on experience, scientific and/or R&D projects that have the value of at least 50 ECTS credits				
2.8.	Studies culminates with a final qualification project (master's thesis)				
3.	**EDUCATIONAL PROCESS**				
3.1	Students admitted into the program meets the requirements of the AEER criteria				
3.2	Students' level of knowledge in natural sciences and mathematics is sufficient				
3.3.a	Study process ensures outcomes achievement				

	by all students				
3.3.b	There are a system of on-going evaluation of students' progress and an efficient feedback mechanism for continuous improvement of the program content and educational technologies				
3.4	*Active learning and students' self-study from open educational resources, including the resources published on the website of the institution, are applied*				
3.5	*The existence of student-centred learning environment and participation of students in the development of individual learning paths is demonstrated*				
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*				
4.	**FACULTY**				
4.1	Faculty is competent in all areas of the curriculum				
4.2	Faculty is highly qualified				
4.2.1.a	Faculty has corresponding fundamental education				
4.2.1.b	Faculty regularly improves its qualification through additional education, internships, etc. and increase pedagogical excellence on a regular basis				
4.2.2	*Faculty has experience in corresponding field of industry and is involved in innovative research projects and engineering projects*				
4.2.3	Faculty is involved in improvement of the whole program and individual courses				
4.2.4	*Faculty holds membership in professional societies, receive grants and scholarships*				
4.2.5	*There are academicians and laureates among the faculty*				
4.2.6	*Industrial representatives are involved in the educational process*				
4.3	Number of the faculty with academic degrees meets the AEER criteria				
4.4	Faculty is actively involved in the R & D, activity design and methodological activity				
4.5	Faculty knows and can justify the necessity of their courses in the program curriculum				
4.6	Faculty fluctuation does not exceed 40 %				
5.	**PROFESSIONAL QUALIFICATION**				

5.1.a	Preparation for engineering activity is ensured throughout the whole period of study				
5.1.b	Experience of innovative engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project				
5.1.c	*There is a students' portfolio with evidence of educational, research and other activities, participation in various contests and competitions*				
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity				
	Program graduates demonstrate the following learning outcomes:				
5.2	**Professional competencies**				
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of deep knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving innovative engineering problems in the appropriate professional area				
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve innovative engineering problems using deep fundamental knowledge, analytical methods and complex models				
5.2.3	**Engineering design.** Demonstrate the ability to develop and design innovative engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration severe economic, ecological, social and other limitations				
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving innovative engineering problems in the appropriate professional area, including the ability to design and conduct complex experimental investigations, draw conclusions under ambiguity using deep knowledge and original methods				
5.2.5	**Engineering practice.** Demonstrate the ability to create and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve innovative engineering problems in the appropriate professional area with consideration of severe limitations				
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies				

	relevant to the problems, objects and innovative engineering activity in the appropriate professional area to potential employers				
5.3	**Universal (general) competencies**				
5.3.1	**Management.** Demonstrate the ability to use knowledge of financial management to regulate innovative engineering activity in the appropriate professional area				
5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of innovative engineering activity in the appropriate professional area				
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving innovative engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team				
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running innovative engineering activity				
5.3.5	**Social responsibility.** Running innovative engineering activity in the appropriate professional area with consideration to:				
5.1.b	- legal and cultural aspects				
	- health protection and safety issues				
	- social responsibility for the professional activity				
	- sustainable development aspects				
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development				
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards				
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents				
5.5.b	Assessment results are used for continuous improvement of the program and the educational process.				
6.	**PROGRAM RESOURCES**				

6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license				
6.2	Library offering all necessary study materials, including textbooks, professional and reference books, relevant periodicals				
6.3	*There is Internet access for faculty and students to global information resources in engineering including national and international databases of recent research public*				
6.4	Students have sufficient opportunities for self-study and research including open educational resources available on the website of the institution				
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work				
6.6	Financial policy and management of department/ institution is aimed improvement of program resources, continuous professional development of faculty and support staff				
6.7.a	Management of the institution is efficient and conducive to the program implementation				
6.7.b	*There is a modern quality management system at the institution*				
7.	**GRADUATES**				
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for master's programs in the appropriate professional area and a system for employment support and career guidance of graduates				
7.1.b	*There is a system for monitoring the professional certification of program graduates*				
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program				
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives				
7.4	Graduates hold the positions that correspond to their qualification				

NOTES:

Association for Engineering Education of Russia

Accreditation Center

IMPLEMENTATION OF THE SYSTEM OF THE PROGRAM QUALITY MANAGEMENT

Work sheet F-5

(filled out and signed by the evaluation team)

Institution _____

Program _____

! Grades are marked in compliance with enclosed Matrix.

	Section	Grade (1-5)
1.	Program objectives	
2.	Stakeholders	
3.	Processes	
4	Learning outcomes assessment	
5.	Learning outcomes	
6.	Quality management system	

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Matrix for implementation of a quality management system of the program

Grade	Program objectives	Stakeholders	Processes	Learning outcomes assessment	Learning outcomes	System of quality management
1	Not well defined	Informal contacts	Few process defined and documented	Carried out on an ad hoc basis	Anecdotal	Not established
2	Generally defined and documented; in full correspondence with the mission of the institution; represent stakeholders' involvement	Involvement in defining objectives, outcomes and their assessment is not clearly defined	Some major processes defined and documented; in full correspondence with the mission of the institution and program objectives	Some outcomes defined and systematically improved; shortcomings comprehended and corrected	Satisfactory outcomes; some evidence of positive prospects of some outcomes	Underdeveloped; partly extended to the program and the department
3	Clearly defined; documented and measurable; in full correspondence with the mission of the institution and stakeholders' needs	Involvement in defining objectives, outcomes and their assessment is clearly defined which assures sustained strategic partnership	Processes for major elements of criteria defined, documented and controlled; in full correspondence with the mission of the institution and stakeholders' needs	Major outcomes defined, systematically assessed and improved; shortcomings foreseen and prevented	Good outcomes; positive prospects of major outcomes; outcomes achievement based on systematic approach	Developed; introduced to the program and the department; determined by the mission and the objectives
4	Clearly defined; documented and measurable; in full correspondence with the mission of the institution and stakeholders' needs; reviewed and updated on a regular basis	Profound involvement in defining objectives, outcomes and their assessment is clearly defined which assures sustained strategic partnership with all groups of stakeholders	Processes for all elements of criteria quantitatively defined, documented and controlled; in full correspondence with the mission of the institution, program objectives and stakeholders' needs	All outcomes defined, the program systematically assessed and improved; some support services involved; causes of shortcomings determined and eradicated	Excellent outcomes; positive prospects of most outcomes; outcomes achievement based on systematic approach	Integrated; introduced to the program, the department and the support services; determined by the mission and the objectives
5	Clearly defined; documented and measurable; in full correspondence with the mission of the institution; easily can be adapted to the stakeholders' needs; reviewed and updated on a regular basis	Profound involvement in defining objectives, outcomes, their assessment and improvement processes is clearly defined which assures sustained strategic partnership with all groups of stakeholders	Processes for all elements of criteria quantitatively defined and controlled; in full correspondence with the mission of the institution, program objectives and stakeholders' needs; serve as a model for other institutions	All outcomes defined, the program systematically assessed and improved; all support services involved; possible causes of shortcomings determined and eradicated	Outcomes meets international standards; sustained results; outcomes achievement based on systematic approach definitely	Sustained, highly integrated; introduced to the program, the department and the institution; determined by the mission and the objectives

Association for Engineering Education of Russia

Accreditation Center

NOTES TO THE REVIEW SHEET OF THE REPRESENTATIVE FROM INDUSTRY

Work sheet F-6 (Master)

(filled out and signed by the industry representative)

Institution _____

Program _____

Representative from industry _____

(Full name)

Date of completing _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"0" – questionable matter

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

! When making the decision on meeting criteria requirements the expert shall make sure all evidences and confirmation certificates are available.

! Number of "0" grades – "questionable matter" shall be minimum.

Criterion number	Criterion content	Final Grade
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**	
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders	
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives	
1.2.b	Program objectives are available for all stakeholders	
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives	
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers	
1.3.2	Learning outcomes are correspond to the readiness of graduates of academic bachelor's programs for complex engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO:	

	conceiving, designing, implementing and operating)	
2.	**PROGRAM CONTENT**	
2.6	Engineering courses, cross-disciplinary modules, design projects, hands-on experience and research provide readiness for innovative engineering activity in accordance with the objectives of the educational program	
2.7	Educational program include hands-on experience, scientific and/or R&D projects that have the value of at least 50 ECTS credits	
2.8.	Studies culminates with a final qualification project (master's thesis)	
3.	**EDUCATIONAL PROCESS**	
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*	
4.	**FACULTY**	
4.2.2	*Faculty has experience in corresponding field of industry and is involved in innovative research projects and engineering projects*	
4.2.6	*Industrial representatives are involved in the educational process*	
5.	**PROFESSIONAL QUALIFICATION**	
5.1.b	Experience of innovative engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project	
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity	
	Program graduates demonstrate the following learning outcomes:	
5.2	**Professional competencies**	
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of fundamental and advanced knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area	
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex engineering problems using fundamental and advanced knowledge, modern analytical methods.	
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into consideration economic, ecological, social and other limitations.	
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving innovative engineering problems in the appropriate professional area, including the ability to design and conduct complex experimental investigations, draw conclusions under ambiguity using deep knowledge and original methods	
5.2.5	**Engineering practice.** Demonstrate the ability to create and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve innovative engineering problems in the appropriate professional area with consideration of severe limitations	
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and innovative engineering activity in the appropriate professional area to potential employers	
5.3	**Universal (general) competencies**	
5.3.1	**Management.** Demonstrate the ability to use fundamental and advanced knowledge of management principles to regulate complex engineering activity in the appropriate professional area	

5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of innovative engineering activity in the appropriate professional area	
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving innovative engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team	
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex engineering activity	
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:	
5.1.b	- legal and cultural aspects	
	- health protection and safety issues	
	- social responsibility for the professional activity	
	- sustainable development aspects	
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development.	
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards	
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents	
5.5.b	Assessment results are used for continuous improvement of the program and the educational process	
6.	**PROGRAM RESOURCES**	
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license	
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work	
7.	**GRADUATES**	
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for master's programs in the appropriate professional area and a system for employment support and career guidance of graduates	
7.1.b	*There is a system for monitoring the professional certification of program graduates*	
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program	
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives	
7.4	Graduates hold the positions that correspond to their qualification	

! In case you put « 0 », «-1 », «-2 » provide grounded explanation.

NOTES:

Association for Engineering Education of Russia

Accreditation Center

FINAL PROGRAM EVALUATION WORK SHEET

Work sheet F-7 (Master)

(filled out and signed by each member of the evaluation team)

Institution _____

Program _____

Fill out the columns with following marks in accordance with the Manual:

"+" – fully meets a criterion

"-1" – program has weaknesses

"-2" – p*rogram has deficiencies*

Criterion number	Criterion content	Final Grade
1.	**PROGRAM OBJECTIVES AND LEARNING OUTCOMES**	
1.1.	Educational program has:	
1.1.1.	Program objectives are clearly defined and documented	
1.1.1.a	Program objectives are in full correspondence with the Federal State Educational Standards (educational standards of the institution)	
1.1.1.b	Program objectives are in full correspondence with the mission of the educational institution	
1.1.1.c	Program objectives are in full correspondence with the needs of employers and other program stakeholders	
1.1.2	Educational program has an efficient system for achievement and improvement of program objectives	
1.2.a	Program objectives are made public	
1.2.b	Program objectives are available for all stakeholders	
1.2.c	Program objectives are shared by each faculty member involved in the program	
1.3	Educational program has clearly defined and documented learning outcomes that are in full correspondence with the program objectives	
1.3.1.	Program outcomes are stated as expected competencies of graduates	
1.3.1.a	Program outcomes are in full correspondence with the Federal State Educational Standards (educational standards of the institution)	
1.3.1.b	Program outcomes are in full correspondence with the professional standards, needs of employers	
1.3.1.c	Program outcomes are in full correspondence with the AEER Criterion 5	
1.3.2	Learning outcomes are correspond to the readiness of graduates of master's programs for innovative engineering activity during the whole lifecycle of technical objects, processes and systems (CDIO: conceiving, designing, implementing and operating)	
2.	**PROGRAM CONTENT**	

2.1	The educational program has the value of at least 120 ECTS credits	
2.2.a	Program curriculum corresponds to the program objectives and ensure achievement of the learning objectives by all program graduates	
2.2.b	Program course (module) syllabus are correspond to the program objectives and ensure achievement of the learning objectives by all program graduates	
2.3.a	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide integration of professional and universal (general) competencies	
2.3.b	Program curriculum includes disciplines and cross-disciplinary modules (courses) that include personal attributes and interpersonal skills	
2.3.c	Program curriculum includes disciplines and cross-disciplinary modules (courses) that provide experience in design of technical objects, systems and technological processes	
2.4	Program curriculum includes courses in natural sciences and mathematics to ensure advanced learning of fundamentals and serve the basis for obtaining required professional competencies by engineering masters	
2.4.1	The courses in natural sciences and mathematics have the value comprise 12-15 ECTS credits ECTS credits for advanced courses	
2.4.2	Studies in natural sciences provide deep knowledge and understanding of phenomena and laws of nature and the ability to use them in solving innovative engineering problems	
2.4.3	Studies in mathematics provide an ability to use mathematical methods and complex models in solving innovative engineering problems	
2.5	Studies in humanities, social sciences and economics provide the basis for development of advanced competencies in:	
	communication	
	leadership	
	project design	
	financial management	
	labour safety	
	health protection	
	sustainable development	
2.6	Engineering courses, cross-disciplinary modules, design projects, hands-on experience and research provide readiness for innovative engineering activity in accordance with the objectives of the educational program	
2.6.1	Engineering and cross-disciplinary courses meets the requirements of the AEER criteria	
2.6.2	Studies in engineering corresponds with the level of training in mathematics and natural sciences and ensure application of the acquired knowledge in engineering practice	
2.7	Educational program include hands-on experience, scientific and/or R&D projects that have the value of at least 50 ECTS credits	
2.8.	Studies culminates with a final qualification project (master's thesis)	
3.	**EDUCATIONAL PROCESS**	
3.1	Students admitted into the program meets the requirements of the AEER criteria	
3.2	Students' level of knowledge in natural sciences and mathematics is sufficient	
3.3.a	Study process ensures outcomes achievement by all students	
3.3.b	There are a system of on-going evaluation of students' progress and an efficient feedback mechanism for continuous improvement of the program	

	content and educational technologies	
3.4	*Active learning and students' self-study from open educational resources, including the resources published on the website of the institution, are applied*	
3.5	*The existence of student-centred learning environment and participation of students in the development of individual learning paths is demonstrated*	
3.6	*There is an effective system for academic mobility of students that implies mastering several disciplines (modules), research projects, hands-on experience and internship at national and international educational or scientific institutions and engineering companies*	
4.	**FACULTY**	
4.1	Faculty is competent in all areas of the curriculum	
4.2	Faculty is highly qualified	
4.2.1.a	Faculty has corresponding fundamental education	
4.2.1.b	Faculty regularly improves its qualification through additional education, internships, etc. and increase pedagogical excellence on a regular basis	
4.2.2	*Faculty has experience in corresponding field of industry and is involved in innovative research projects and engineering projects*	
4.2.3	Faculty is involved in improvement of the whole program and individual courses	
4.2.4	*Faculty holds membership in professional societies, receive grants and scholarships*	
4.2.5	*There are academicians and laureates among the faculty*	
4.2.6	*Industrial representatives are involved in the educational process*	
4.3	Number of the faculty with academic degrees meets the AEER criteria	
4.4	Faculty is actively involved in the R & D, activity design and methodological activity	
4.5	Faculty knows and can justify the necessity of their courses in the program curriculum	
4.6	Faculty fluctuation does not exceed 40 %	
5.	**PROFESSIONAL QUALIFICATION**	
5.1.a	Preparation for engineering activity is ensured throughout the whole period of study	
5.1.b	Experience of innovative engineering activity is gained with mastering cross-disciplinary modules of the program, carrying out R&D projects, work-based training, project works and a final qualification project	
5.1.c	*There is students' portfolio with evidence of educational, research and other activities, participation in various contests and competitions*	
5.1.d	All graduates achieve the learning outcomes that are aligned to professional standards and required for professional activity	
	Program graduates demonstrate the following learning outcomes:	
5.2	**Professional competencies**	
5.2.1	**Application of fundamental knowledge.** Demonstrate the application of fundamental and advanced knowledge in mathematics, natural sciences, humanities, social sciences, economics and engineering in a cross-disciplinary context for solving complex engineering problems in the appropriate professional area	
5.2.2	**Engineering analysis.** Demonstrate the ability to formulate and solve complex engineering problems using fundamental and advanced knowledge, modern analytical methods.	
5.2.3	**Engineering design.** Demonstrate the ability to develop and design complex engineering projects (technical products, systems and technological processes) in the appropriate professional area taking into	

	consideration economic, ecological, social and other limitations.	
5.2.4	**Investigation.** Demonstrate the ability to conduct investigations when solving innovative engineering problems in the appropriate professional area, including the ability to design and conduct complex experimental investigations, draw conclusions under ambiguity using deep knowledge and original methods	
5.2.5	**Engineering practice.** Demonstrate the ability to create and apply appropriate resources and methods including forecasting and simulation, modern engineering and IT-tools to solve innovative engineering problems in the appropriate professional area with consideration of severe limitations	
5.2.6	**Specialization and labour market commitment.** Demonstrate the competencies relevant to the problems, objects and innovative engineering activity in the appropriate professional area to potential employers	
5.3	**Universal (general) competencies**	
5.3.1	**Management.** Demonstrate the ability to use fundamental and advanced knowledge of management principles to regulate complex engineering activity in the appropriate professional area.	
5.3.2	**Communication.** Demonstrate an effective communication with engineering community and society in national and international contexts; development of documents; presenting and advocating outputs of innovative engineering activity in the appropriate professional area	
5.3.3	**Individual and team work.** Demonstrate an effective individual work and work as a team member or a team leader including in a cross-disciplinary team when solving innovative engineering problems in the appropriate professional area; ability to distribute responsibility and authority in a team	
5.3.4	**Professional ethics.** Demonstrate personal responsibility and commitment to the code of professional ethics when running complex engineering activity.	
5.3.5	**Social responsibility.** Running complex engineering activity in the appropriate professional area with consideration to:	
5.1.b	- legal and cultural aspects	
	- health protection and safety issues	
	- social responsibility for the professional activity	
	- sustainable development aspects	
5.3.6	**Life-long learning.** Recognising the need for and ability to engage in self-study and on-going professional development.	
5.4	Program ensures outcomes achievement by all students necessary for their further professional activity that correspond to the field of engineering and professional standards	
5.5.a	Institution has a system for assessment of learning outcomes in the program as a whole and in particular disciplines (modules). Achievement of such learning outcomes is verified by appropriate documents.	
5.5.b	Assessment results are used for continuous improvement of the program and the educational process.	
6.	**PROGRAM RESOURCES**	
6.1	Facilities, information infrastructure and financial resources provision meets the figures of the license	
6.2	Library offering all necessary study materials, including textbooks, professional and reference books, relevant periodicals	
6.3	*There is Internet access for faculty and students to global information resources in engineering including national and international databases of recent research public*	
6.4	Students have sufficient opportunities for self-study and research including	

	open educational resources available on the website of the institution	
6.5	Institution has adequate resources (classrooms, equipment, tools, etc.) to provide research, scientific and design activity and self-study of students, acquisition of experience in development of engineering objects and systems, in particular, using team-work	
6.6	Financial policy and management of department/ institution is aimed improvement of program resources, continuous professional development of faculty and support staff	
6.7.a	Management of the institution is efficient and conducive to the program implementation	
6.7.b	*There is a modern quality management system at the institution*	
7.	**GRADUATES**	
7.1.a	The program has at least one graduation in order to be accredited. There are a systems for monitoring the labour market and analysing the demand for master's programs in the appropriate professional area and a system for employment support and career guidance of graduates	
7.1.b	*There is a system for monitoring the professional certification of program graduates*	
7.2	The results are used for revision of program objectives and expected learning outcomes and for further development of the educational program	
7.3	Program stakeholders (graduates, employers) confirm the achievement of program objectives	
7.4	Graduates hold the positions that correspond to their qualification	

Chairman of the evaluation team _____ Full Name

Program evaluators _____ Full Name

_____ Full Name

_____ Full Name

_____ Full Name

Date: _____

Appendix I – Plan of Activities

APPROVED BY

Rector of XTU
_____ K.K. Kovalev

Plan of Activities

of the Evaluation Team

of the Association for Engineering Education of Russia

X's Technical Institution

Program 552800 "Informatics and computer engineering"

Time	Activity	Place	Responsible Person
Day 1 (21.09.2011, Tuesday)			
	Arrival, lodging		Associate Professor A.A. Anisimov
17.30-19.00	Meeting of the members of the evaluation team	Voskhod Hotel	Chairman of the evaluation team I.I. Ivanov
19.00-20.00	Dinner	Raduga Café	Associate Professor A.A. Anisimov
Day 2 (22.09.2011, Wednesday)			
8.00-9.00	Breakfast	Voskhod Hotel	Associate Professor A.A. Anisimov
9.00–9.30	Meeting with the administration of the institution and the persons responsible for accreditation arrangements	Rector's office/main building	Person responsible for accreditation arrangements Professor L.L. Lebedev
9.30-10.00	Meeting of the Chairman with the Dean of the Faculty Prof. G.G. Kovalevsky (I.I. Ivanov)	Room 325/ building 3	Person responsible for accreditation arrangements Professor L.L. Lebedev
9.30-10.30	Visit to the library (P.P. Petrov)	Library	Director, Associate Professor M.S. Tayurskaya
9.30-10.30	***Evaluation of complying with criteria 2,5,6 : departments and laboratories of NSM cycle*** (S.S. Sidorov, K.K. Kuznetsov)	Building 7	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
10.30-10.45	Meeting with head of chemical laboratory Associate Professor S.N. Khomov (I.I. Ivanov, K.K. Kuznetsov)	Room for evaluation team	Head of Department, Professor V.P. Zapko
10.30-10.45	Meeting with Professor of the Department of General Physics P.L. Muzin, person in charge for course paper in mechanical engineering (P.P. Petrov, S.S. Sidorov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
10.45-11.00	Meeting with head of Laboratory of Experimental Physics A.I. Philipov (S.S. Sidorov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky

10.45-11.00	Meeting with head of Department of Higher Mathematics Prof. A.S. Voronov (I.I. Ivanov, P.P. Petrov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
11.00-11.20	Meeting with head of Department of Economics Prof. A.S. Voronov (I.I. Ivanov, P.P. Petrov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
11.00-11.20	Meeting with head of Department of English Language Prof. Yu.S. Kruchkov (I.I. Ivanov, P.P. Petrov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
11.20-12.45	***Evaluation of complying with criterion 5:*** Review of samples of final qualification works, course papers and course projects (I.I. Ivanov, P.P. Petrov, S.S. Sidorov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
12.45-14.00	Lunch	Canteen of the main building	Associate Professor A.A. Anisimov
14.00-14.50	***Evaluation of complying with criteria 2, 5, 6: departments and laboratories of GSD*** (I.I. Ivanov, P.P. Petrov, S.S. Sidorov, K.K. Kuznetsov)	Building 9	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
14.50-15.20	Meeting with Associate Professor of the Department of Fundamentals of Control Systems A.F. Fadeev, person responsible for course papers in system analysis (S.S. Sidorov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
14.50-15.20	***Evaluation of complying with criteria 5, 6 :*** Laboratory of new information technologies (I.I. Ivanov, P.P. Petrov)	Laboratory	Head of Laboratory, Professor R.D. Sorokin
15.20-15.50	Meeting with Associate Professor of the Department of Automation and Computer Systems E.I. Gromakov, person responsible for laboratory works in internet technologies (I.I. Ivanov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
15.20-15.50	Meeting with faculty of the Department of Informatics and Computer Systems I.O. Muraviev, person responsible for curriculum (S.S. Sidorov, P.P. Petrov)	Room for evaluation team	Head of Department, Professor V.A. Ilyin
...	...		Full name
18.00-19.00	Dinner	Canteen of the main building	Associate Professor A.A. Anisimov
19.00-20.00	Meeting of the members of the evaluation team	Voskhod Hotel	Chairman of the evaluation team I.I. Ivanov
Day 3 (23.09.2011, Thursday)			
8.00-9.00	Breakfast	Voskhod Hotel	Associate Professor A.A. Anisimov
9.00-10.00	***Evaluation of complying with criteria 2, 5, 6: departments and laboratories of special disciplines*** (I.I. Ivanov, P.P. Petrov, S.S. Sidorov, K.K. Kuznetsov)	Room 12/ building 3	Person responsible for accreditation arrangements Professor L.L. Lebedev
10.00-10.15	Meeting with Professor of the Department of Software Engineering, person responsible for course papers in system simulation (I.I. Ivanov, P.P. Petrov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
10.15-10.30	Meeting with Associate Professor of the Department of Software Engineering R.I. Gromov, person responsible for laboratory works in multimedia technologies (I.I. Ivanov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky

10.00-10.30	Review of facilities of the Laboratory of Microcontrollers of the Department of МКУ (S.S. Sidorov, K.K. Kuznetsov)	Room 22/ building 4	Head of Laboratory, Professor S.P. Vavilov
...	...		
12.30-14.00	Lunch	Canteen of the main building	Associate Professor A.A. Anisimov
14.00-17.00	Visit to specialized enterprise (P.P. Petrov, S.S. Sidorov)	Enterprise	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
14.00-15.00	***Meeting with faculty of the Department of Computer Engineering*** (I.I. Ivanov, K.K. Kuznetsov)	Room 122/ building 4	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
14.00-14.50	***Evaluation of complying with criteria 2, 5: Humanities and social and economic sciences*** (I.I. Ivanov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
14.50-15.20	Meeting with Prof. Yu.V. Gasheva, person responsible for course papers in economics (I.I. Ivanov, K.K. Kuznetsov)	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
16.00-17.00	***Meeting with students of the Department of Computer Engineering*** (I.I. Ivanov, K.K. Kuznetsov)	Room 122/ building 4	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
...	...		
18.00-19.00	Dinner	Uyut Café	Associate Professor A.A. Anisimov.
19.00-20.00	Meeting of the members of the evaluation team	Voskhod Hotel	Chairman of the evaluation team I.I. Ivanov
Day 4 (24.09.2011, Friday)			
8.00-9.00	Breakfast	Voskhod Hotel	Associate Professor A.A. Anisimov
9.00-10.30	Preparation of the evaluation team report	Room for evaluation team	Chairman of the evaluation team I.I. Ivanov
10.30-11.15	Meeting with the Dean of the Faculty Prof. G.G. Kovalevsky and the persons responsible for accreditation arrangements	Room for evaluation team	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
11.30-12.00	Final meeting with the administration of the institution and the persons responsible for accreditation arrangements	Rector's Office	Dean of the Department of Computer Engineering, Professor G.G. Kovalevsky
12.00-13.30	Lunch	Canteen of the main building	Associate Professor A.A. Anisimov
18.00-19.00	Dinner	Raduga Café	Associate Professor A.A. Anisimov
	Departure		Associate Professor A.A. Anisimov

Chairman of the evaluation team I.I. Ivanov

! Plan of activities shall contain full names, degree and position of its participants.

Appendix II – Evaluation Report

ASSOCIATION FOR ENGINEERING EDUCATION OF RUSSIA
ACCREDITATION CENTER

PROFESSIONAL ACCREDITATION OF ENGINEERING PROGRAMS

EVALUATION REPORT

ON THE PROGRAM OF
X'S TECHNICAL INSTITUTION

Program:

552800.62 "Informatics and computer engineering"

2014

Self-study report received:	August 1, 2014
On-site visit carried out:	September 21 – 24, 20114
Report sent to institution:	October 7, 2014

Evaluation team:

Ivan I. Ivanov	Candidate of Technical Sciences, Professor, Kazan State Technological University
Petr P. Petrov	Candidate of Technical Sciences, Associate Professor, St.Petersburg Electrotechnical University (LETI)
Sidor S. Sidorov	Doctor of Technical Sciences, Professor, Tomsk Polytechnic University
Kirill K. Kuznetsov	OJSC X's Production Association
Boris B. Boev	AEER Accreditation Center

Appendices:

1. Plan of activities of the evaluation team
2. Minutes

Introduction

An application for accreditation of the program **552800 "Informatics and computer engineering"** was submitted to the AEER by X's Technical Institution (further to be referred to as the University). The materials of self-study of the program according to AEER criteria have been presented in the Accreditation Center.

The Accreditation Center appointed the following experts to be the members of the program evaluation team: I.I. Ivanov (Chairman), P.P. Petrov, SK.K. Kuznetsov and B.B. Boev. The evaluation team analyzed the self-study report presented by the university and made an on-site visit on September 21-24, 2014. The program of work (Appendix 1) was confirmed by the rector, Prof. K.K. Kovalev during a meeting of the evaluation team with University management. The following representatives of the institution took part in meetings during audit:

1. Kripanov, N.K., NTU Vice Rector for Academic Affairs;
2. Kovalevsky, G.G., Dean of Automatics and Computer Science Dept.;
3. Kabanov, Yu.S., Head of Computer Science Dept.;
4. Nasibullin, R. T, Manager of the Social Studies Dept.;
5. Safina, E.V., Head of Quality Management Dept.;
6. Krymov, V. G, Manager of International Relations Dept.

Besides, teachers, students, graduates, university employees and representatives of employers contributed to the sessions and discussions with the evaluation team.

The evaluation tem studied all necessary regulations and organizational documents for the educational program, including the curriculum and working programs of disciplines, samples of students' works and graduation papers, yeaching complexes of disciplines and other materials provided by the university for audit. Evaluation experts visited base enterprise "Computer center" which serves as the main academic premise and which provides job placement for many graduates of the program 552800.62 "Computer science and computer technology". Company director V. I. Safarova, and J.I Murinov, a Cybernetics laboratory manager, took part in meetings with the evaluation team members.

All materials requested by the experts, were submitted in due time and in full package. The team completely fulfilled the plan of work at the University; the Minutes following the audit outcomes were signed (Appendix 2).

It should be noted that all faculty employees and university management demonstrated keen interest and enthusiasm in accreditation of the program by AEER.

General information concerning the university and the program

X Technical University is the higher educational institution having the licence for conducting educational activity issued by the Federal Agency of supervision in education and science (registration number 8967, series A No.268608 of April 22, 2009) and the Certificate on the State Accreditation (registration number 0820, series AA No. 000832 of July 12, 2009).

The University passed public and professional accreditation in the AEER Accreditation Center in 2013 on the following educational programs in engineering and technology:

- 280200.62 “Environmental Protection”;
- 150501.65 “Materials technology in mechanical engineering”.

Bachelor degree program 552800.62 “Computer science and computer technology” was presented for accreditation in AEER for the first time.

The University is the largest research and education center that includes 7 faculties, 5 research institutes, 2 academic research institutes, 49 research laboratories, 6 interuniversity research laboratories, 9 joint research industrial complexes, 5 joint research and education centers of technology, and a laboratory- based testing complex. The University provides training to 18,105 students, 990 teachers, among them 127 doctors of science and 492 candidates of science.

The university offers training in 49 specialities, 19 educational lines for bachelor’s degree training and 13 educational lines for master’s degree training in engineering and technology. It makes 79 %, 66 % and 77 % respectively of the total number of all educational programs at the University. Post-graduate programs in engineering and technology make 69 % of the total number of all educational programs at the University. Automatics and Computer Science Department has been providing bachelors’ training in computer science and computer technology since 1994 (552800). Currently 128 students are being trained on this program; 24 teachers have been involved into program implementation. For the last 5 years 40 candidates have been enrolled for the program annually; in 2014 24 bachelor degree students graduated successfully.

Program compliance with AEER criteria

CRITERION 1. PROGRAM OBJECTIVES

Requirement 1.1 - is carried out completely.

The program has clearly stated objectives that are in full correspondence with the institution mission and meet the demand of labor market. However, the experts consider as a shortcoming of the program that there is no effective system for regular assessment of program objectives achievement.

The evaluation team considers possible to spend regular polls of company managers and graduates for conformity of graduates' training to requirements of modern industry and further program improvement.

Requirement 1.2 - is carried out completely.

The program objectives are supported by the team of the department participating in fulfillment of the educational program and are published on a corporate website for better access for all interested parties.

Total estimation of criterion 1: acceptable.

CRITERION 2. PROGRAM CONTENT

Requirement 2.1 - is carried out completely.

The educational program has precisely formulated documentary training outcomes that perfectly agree with program objectives.

Requirement 2.2 - is carried out completely.

The educational program contents correspond to 240 ECTS credits.

Requirement 2.4.1 - is carried out partially.

The volume of the block of natural sciences and mathematics makes 39 ECTS credits that does not correspond to the criterion requirement (60 credits), including advanced courses - 22 ECTS credits (the criterion requirement - 24).

The remark of the evaluation team: the block size of natural science disciplines and mathematics does not correspond to the criterion requirement, which is an obvious program disadvantage.

Separate opinion: Expert I.I. Ivanov noted an insufficient level of study of methods of optimization and discrete mathematics.

Recommendations of the evaluation team: it is necessary to strengthen base preparation in mathematics.

Requirement 2.6 - is carried out completely.

The evaluation team notes that the faculty places special emphasis on preparation

of students in special disciplines that can be regarded as a very strong point of the program.

Total estimation of criterion 2: acceptable with remarks.

In a similar manner describe each criterion noting level of meeting the requirements, strong points, shortcomings and (if any) special opinion of the members of the evaluation team.

CRITERION 7. GRADUATES

Requirement 7.1 - is carried out completely.

…

Requirement 7.2 - is carried out partially.

Recommendations of the evaluation team: it is necessary to carry our systematic analysis of the collected data on employment and to use the analysis results for program improvement.

Total estimation of criterion 7: **acceptable with recommendations.**

Conclusion

On the basis of the self-study materials presented by the University and the audit of the bachelors' degree educational program conducted by the team of experts (Speciality 552800.62 - "Computer science and computer technology" of X Technical University), Accreditation Center of the Association for Engineering Education of Russia has come to the following conclusions, namely:

− Despite some revealed weaknesses and disadvantages, the program satisfies AEER criteria of accreditation of programs of the first cycle on specialists' training in engineering and technology;

− Evaluation team of experts recommends to take relevant measures aimed at further improvement of the program in compliance with the recommendations of the present report;

− Evaluation team of experts recommends **to accredit the program for a period of 5 years.**

Director of the AC AEER _____ Full Name

October 6, 2014

Appendix III – Minutes

On September 21-24, 2014 the evaluation team of the Accreditation Center of the Association for Engineering Education of Russia consisting of the Chairman I.I. Ivanov, experts P.P. Petrov, S.S. Sidorov and the representative from industry K.K. Kuznetsov made an on-site visit to X's Technical Institution to examine the program of the university in accordance with the Agreement № 01-01 of January 15, 2014.

During the visit:

1. Meetings of the evaluation team with the Rector of X's Technical Institution K.K. Kovalev, Associate professor L.L. Lebedev responsible for accreditation arrangements, Dean of the Faculty of Computing Engineering G.G. Kovalevsky, teaching staff and students of the Faculty were held.

2. Audit of the program 552800 "Informatics and computer engineering" including review of the diploma supplements, curriculum and syllabi of the program, samples of students' papers and other material submitted by the institution was carried out during the visit.

3. Information requested by the evaluation team was presented by X's Technical Institution completely.

4. A duplicate of the evaluation report on the program of X's Technical Institution and the Minutes were passed to the Rector.

Chairman of the evaluation team I.I. Ivanov

Rector of X's Technical Institution K.K. Kovalev

Appendix IV – Glossary

Accreditation of educational programs (*credo* (Latin) - belief, trust) - the process aimed at provision of high quality of specialists' training. Accreditation reveals strengths and weaknesses of educational programs by carrying out self- study conducted by the institution, and audit of an educational program by the evaluation team of independent experts, development and implementation of measures aimed at its improvement, and social recognition of educational program quality.

Advanced courses/disciplines - the disciplines demanding preliminary study of fundamentals in a particular subject.

Assessment - one or more processes of determination, gathering, accumulation and analyzing data used for estimating program objectives and tasks achievement as well as for program improvement.

Audit of educational programs - estimation of the program by the team of independent experts on the basis of studying of materials of self-study and visit to the institution pursuing the following:

1. to reveal strengths and weaknesses of the university and the educational program under accreditation.
2. to estimate the qualitative factors which are not given adequate description in self-study materials.
3. to inspect adequacy of the information presented by the university in self-study materials.

Stakeholders of the program - students, employers, the state, including governmental departments of education, sponsors and other parties whose interests involved in the objectives of the educational program.

Criterion - the requirement (or set of requirements) according to which quality of specialists' training is estimated. In the present document the given term can be referred to AEER Accreditation Criteria of educational programs in engineering and technology.

Estimation - definition of the degree of achievement of program objectives and outcomes and specifying actions for educational program improvement.

General professional and special disciplines - base and special disciplines for engineering and technology. The block includes general engineering subjects, such as

mechanics, thermodynamics, materials technology, etc. and the disciplines of specialisation providing profound knowledge, skills in the field of professional training.

Humanities and social and economic disciplines - the disciplines that provide graduates' knowledge about the society, law, economy, literature, history, linguistics, etc.

Method of estimation of learning outcomes and achievement of the program objectives - a way of data gathering and accumulation for the subsequent analysis and definition of the degree of achievement of program objectives and outcomes.

Mission - the statement describing understanding the ambition and activity by the people in an organization, which makes it different from the similar organizations. The mission defines the university strategy and objectives including those of a particular educational program. The mission should be formulated taking into account requirements of potential customers.

Natural sciences and mathematics include chemistry, biology, geology, and other disciplines which, as a rule, form a basis for professional disciplines including various sections of mathematics and sciences studying objects, laws of nature and natural phenomena.

Objectives of the educational program - a complex of knowledge, abilities, skills and methods that should be acquired by the graduates of the program in some time after completion of the program. It should be noted that some objectives can be regarded as mandatory, i.e. achieved by all graduates while others can be only achieved by the most advanced graduates.

Learning outcomes - a complex of knowledge, abilities, skills and methods that should be acquired by the graduates upon completing the program.

Processes - a complex of consistent and coordinated activities that transform needs of the stakeholders of the program at the input into satisfaction of these needs at the output.

Quality management - a coordinated activity on management with reference to quality.

Quality of an educational program - degree of conformity of characteristics and outcomes of an educational program to the established requirements.

Self-study - introspection of advantages and disadvantages of a particular higher

educational institution and the program submitted to accreditation, including the performance analysis of achievement by the university and the program of the declared objectives in the field of specialists' training.

System of quality management - a system for elaborating policy and objectives of program quality matters and the objectives achievement.