



Saint-Petersburg State Polytechnic University



«EUR-ACE and Russian
Educational Standards:
Alignment of Engineering
Master Graduates'
Attributes»

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EUR-ACE FS and Russian FES Alignment

Different terms of the documents

Necessity to fit both sets of requirements

Plan:

- EUR-ACE Framework Standard Requirements
- RFES Structure and Terms
- Approach to Alignment Procedure





EUR-ACE FS and Russian FES Alignment

EUR-ACE Framework Standard Requirements

6 positions:

- Knowledge and Understanding
- Engineering Analysis
- Engineering Design
- Investigations
- Engineering Practice
- Transferable Skills





EUR-ACE FS and Russian FES Alignment

Knowledge and Understanding

The underpinning knowledge and understanding of science, mathematics and engineering fundamentals are essential to satisfying the other programme outcomes. Graduates should demonstrate their knowledge and understanding of their engineering specialisation, and also of the wider context of engineering.





EUR-ACE FS and Russian FES Alignment

Knowledge and Understanding

Second Cycle graduates should have:

- an in-depth knowledge and understanding of the principles of their branch of engineering;
- a critical awareness of the forefront of their branch.





EUR-ACE FS and Russian FES Alignment

Engineering Analysis

Graduates should be able to solve engineering problems consistent with their level of knowledge and understanding, and which may involve considerations from outside their field of specialisation.





EUR-ACE FS and Russian FES Alignment

Engineering Analysis

Analysis can include the identification of the problem, clarification of the specification, consideration of possible methods of solution, selection of the most appropriate method, and correct implementation. Graduates should be able to use a variety of methods, including mathematical analysis, computational modelling, or practical experiments, and should be able to recognise the importance of societal, health and safety, environmental and commercial constraints.





EUR-ACE FS and Russian FES Alignment

Engineering Analysis

Second Cycle graduates should have:

- the ability to solve problems that are unfamiliar, incompletely defined, and have competing specifications;
- the ability to formulate and solve problems in new and emerging areas of their specialisation;
- the ability to use their knowledge and understanding to conceptualise engineering models, systems and processes;
- the ability to apply innovative methods in problem solving.





EUR-ACE FS and Russian FES Alignment

Engineering Design

Graduates should be able to realise engineering designs consistent with their level of knowledge and understanding, working in cooperation with engineers and non-engineers. The designs may be of devices, processes, methods or artefacts, and the specifications could be wider than technical, including an awareness of societal, health and safety, environmental and commercial considerations.





EUR-ACE FS and Russian FES Alignment

Engineering Design

Second Cycle graduates should have:

- an ability to use their knowledge and understanding to design solutions to unfamiliar problems, possibly involving other disciplines;
- an ability to use creativity to develop new and original ideas and methods;
- an ability to use their engineering judgement to work with complexity, technical uncertainty and incomplete information.





EUR-ACE FS and Russian FES Alignment

Investigations

Graduates should be able to use appropriate methods to pursue research or other detailed investigations of technical issues consistent with their level of knowledge and understanding. Investigations may involve literature searches, the design and execution of experiments, the interpretation of data, and computer simulation. They may require that data bases, codes of practice and safety regulations are consulted.





EUR-ACE FS and Russian FES Alignment

Investigations

Second Cycle graduates should have:

- the ability to identify, locate and obtain required data;
- the ability to design and conduct analytic, modelling and experimental investigations;
- the ability to critically evaluate data and draw conclusions;
- the ability to investigate the application of new and emerging technologies in their branch of engineering.





EUR-ACE FS and Russian FES Alignment

Engineering Practice

Graduates should be able to apply their knowledge and understanding to developing practical skills for solving problems, conducting investigations, and designing engineering devices and processes. These skills may include the knowledge, use and limitations of materials, computer modelling, engineering processes, equipment, workshop practice, and technical literature and information sources. They should also recognise the wider, non-technical implications of engineering practice, ethical, environmental, commercial and industrial.





EUR-ACE FS and Russian FES Alignment

Engineering Practice

Second Cycle graduates should have:

- the ability to integrate knowledge from different branches, and handle complexity;
- a comprehensive understanding of applicable techniques and methods, and of their limitations;
- a knowledge of the non-technical implications of engineering practice.





EUR-ACE FS and Russian FES Alignment

Transferable Skills

The skills necessary for the practice of engineering, and which are applicable more widely, should be developed within the programme.

Second Cycle graduates should be able to:

- fulfil all the Transferable Skill requirements of a First Cycle graduate at the more demanding level of Second Cycle;
- function effectively as leader of a team that may be composed of different disciplines and levels;
- work and communicate effectively in national and international contexts.





EUR-ACE FS and Russian FES Alignment

Russian Federal State Educational Standard (RFES)

Learning outcomes = Competencies

(Example: “Information systems and computers” field of study)

- general cultural competencies (ОК);
- professional competencies (ПК)
 - fields of activity:
 - research;
 - constructional design;
 - technology (process) design;
 - management.





EUR-ACE FS and Russian FES Alignment

RFES

Professional competencies

- research
- constructional design
- technology (process) design

- management
- Cultural competencies

EUR-ACE FS

- Knowledge
- Engineering analysis
- Engineering design
- Investigations
- Engineering practice

- Transferable skills





EUR-ACE FS and Russian FES Alignment

RFES Professional LO of master degree graduates

Research activity

to use modern (prospective) research methods and solutions of professional problems on the base of knowledge of world trends of the field of study (ПК-1)

Teaching (additionally to research activity)

to take part in teaching in the field of study on the base of knowledge of teaching methods (ПК-2)





EUR-ACE FS and Russian FES Alignment

RFES Professional LO of master degree graduates

Constructional design activity

- to design and implement plans of information systems building of enterprises and their departments on the base of Web- and CALS-technologies (ПК-3)
- to elaborate technical specifications and to take part in design of soft- and hardware (ПК-4)
- to choose methods and to develop algorithms for problems solutions in a field of automation control and for design of objects' automation control (ПК-5)





EUR-ACE FS and Russian FES Alignment

RFES Professional LO of master degree graduates

Technology (process) design activity

to use modern technologies of program complexes design with the CASE tools aid, to control a quality of designed software (ПК-6)

Managerial activity

to manage teams of soft- and hardware designers of information and automation control systems (ПК-7)





EUR-ACE FS and Russian FES Alignment

Comparison of RFES and EAFS

There are no one-to-one relations

Additional complexity:

rather different terms of the documents

There is no guarantee to fit EAFS requirements on base of
RFES only

The problem is:

**How to develop RFES learning outcomes in order to fit
EAFS requirements?**





EUR-ACE FS and Russian FES Alignment

Alignment of RFES and EAFS

RFES gives only minimal requirements

Authors of a program may

- 1) add new learning outcomes;
- 2) Add more detailed interpretation of defined LO.

One of helpful approaches is “relations matrix”





EUR-ACE FS and Russian FES Alignment

Alignment of RFES and EAFS

Advantages of “relations matrix” implementation:

- indicates LO in a wrong set;
- indicates RFES LO not required by EAFS;
- indicates EAFS LO not included in EAFS LO set;
- gives general ideas for corrections of RFES LO in terms of EAFS by decomposition or aggregation / generalization procedures.





EUR-ACE FS and Russian FES Alignment

Alignment of RFES and EAFS

It is suitable to split “relations matrix” in 2 parts:

- engineering LO;
- transferable skills or general cultural LO.





Спасибо за внимание!

Thank you
for your attention!

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