



Example of
Programme Handbook

Master in Energy Efficient Buildings

General Entry

Study Programme

Master in Energy Efficient Buildings

Cycle /Level

National Qualification Framework: 2nd cycle;
Qualifications Framework for the European Higher Education Area (QF for EHEA): 2nd cycle;
European Qualifications Framework for Lifelong Learning (EQF for LLL): Level 7

Type of Degree & Duration

Single degree (120 ECTS credits, 2 years).
The degree is the result of a programme offered by a single Institution.

Institution(s)

Ural Federal University, Ekaterinburg, Russian Federation

Purpose

To prepare graduates with a strong background in energy efficiency and able to conceive, design, implement and operate energy efficient buildings, contributing to the improvement of the life quality and to the energy development sustainability.

Discipline(s) / Subject area(s)

Main disciplines of the SP are the those in thermal sciences, simulation and financial/project management.

General / Specialist Focus

The SP is a specialist programme focused on the subject of efficient buildings.

Orientation

The SP is a professional and applied programme, related to specific employment opportunities.

Teaching & Learning Approaches

The teaching approach is teacher guided.
Main teaching and learning methods are: lectures, seminars, laboratory classes, practical work, individual study based on text books and lecture notes but also group work.

Assessment Methods

Written exams, oral exams, oral presentations, written essays, laboratory reports, case studies, project work.

Distinctive Features

The SP is taught in English.

Educational needs of the labour market and other stakeholders

Educational needs of the labour market

In order to identify the educational needs of the labour market, a survey by questionnaire was carried out among organizations involved at different levels in the field of energy efficient buildings.

The investigation was carried out in the period 08/03/2016-01/04/2016. The organizations who answered the questionnaire were 109: 87 from Russia, 21 from Armenia, 1 from a European country (registered office Denmark).

Both the characteristics of the consulted organization and the questionnaire used for the

consultation are reported in the document *Stakeholders' Report*.

Also the identified educational needs and expectations of the labour market of reference are documented in the *Stakeholders' Report*. In synthesis, the Master graduates in Energy Efficient Buildings are requested to have:

Specific skills

- Strong background in thermodynamics / heat transfer
- Skills in material science
- Skills in the field of heating plant and building modelling
- Background about energy savings in buildings
- Skills in the field of renewable energy
- Skills regarding energy auditing of buildings
- Skills in the field of project management
- Skills in the field of economics and investment evaluation
- Skills in the field of thermo-economic analysis

Soft skills

- Good reading/writing skills in English
- Good with numbers
- General computer skills (e.g. office automation, internet, etc.)
- Communication skills
- Ability to work in team
- Analytical and problem-solving skills
- Decision-making skills
- Planning and organizational skills

Educational needs of other stakeholders

The educational needs of the labour market are considered by far the most important for the definition of educational objectives of a Master in Energy Efficient Buildings. Consequently, no other stakeholders outside of those of the labour market have been consulted.

Educational objectives

Main aim of the Master to prepare graduates with a strong background in energy efficiency and able to conceive, design, implement and operate energy efficient buildings.

In order to enable graduates to achieve this aim, students should develop and obtain a set of competences – intended as the capacity to use knowledge and professional and soft skills in work situations – that have been identified in agreement with the identified educational needs of the labour market of reference and the resources available to the awarding institution as follows:

- ability to apply knowledge and understanding of engineering disciplines underlying Energy Efficient Buildings subject area, with specific reference to the following disciplines: Heat transfer, Thermodynamics, Thermal Measurements, Renewable Energy Systems, Acoustics, to solve / design / investigate / conduct complex problems / products, processes and systems / issues / activities in the subject area;
- ability to analyse and solve complex problems, to design complex products (devices, artefacts, etc.), processes and systems, to investigate complex issues, in the Energy Efficient Buildings subject area, with specific reference to the following topics: HVAC Systems, Heat Pumps and Refrigeration Systems, Renewable Energy Systems, Thermal Design and Optimization.
- ability to implement and conduct complex activities using and applying practical knowledge, by identifying both societal, health and safety, environmental impact and risks and economic, industrial and managerial implications, taking appropriate decisions, and to meet deliverable, schedule and budget requirements, while fulfilling all legal and regulatory requirements.

The main areas in which graduates can find employment and level of responsibility they are qualified to take can be identified as follows: positions in companies/small enterprises and institutions (research, quality assurance, commerce) from energy using technological sector, energy saving in enterprises, environmental sector. Positions in energy audit. Teaching positions.

Programme Learning Outcomes

In order to enable students to achieve the programme educational objectives, the following programme learning outcomes – intended as what a student is expected to know, understand and/or be able to demonstrate after completion of the learning process - have been established:

- demonstrate knowledge and understanding of energy efficiency and energy saving innovation technologies at the fundamentals level;
- demonstrate knowledge and understanding of sustainable energy development, energy audit, environmental protection;
- demonstrate knowledge and understanding of engineering disciplines underlying Energy Efficient Buildings, at a level necessary to achieve the other programme outcomes, having some awareness at their forefront;
- identify, formulate, analyse and solve complex problems related to Energy Efficient Buildings that may be unfamiliar and involve non-technical – societal, health and safety, environmental, economic and industrial – constraints;
- conceive and design complex civil products (devices, artefacts, etc.), processes and systems related to Energy Efficient Buildings that may be that may be unfamiliar and non-technical – societal, health and safety, environmental, economic and industrial – constraints;
- carry out numerical simulation, in order to pursue detailed investigations and research of complex technical issues in Energy Efficient Buildings subject area;
- design and conduct experimental investigations, critically evaluate results and draw conclusions, in Energy Efficient Buildings subject area;
- implement and conduct complex activities related to Energy Efficient Buildings by identifying societal, health and safety, environmental impact and risks and acting appropriately, and meet deliverable, schedule and budget requirements, while fulfilling all legal and regulatory requirements;
- manage complex work contexts related to Energy Efficient Buildings, take decisions and formulate judgments demonstrating critical awareness of the ethical and social responsibilities.

It is assumed that skills such as:

- good reading/writing skills in English
- good with numbers
- general computer skills (e.g. office automation, internet, etc.)
- communication skill
- ability to work in team

have been already acquired by students in Bachelor programmes. However, the Master's educational process is also finalized to strengthen these skills.

Curriculum

The curriculum of the Master in Energy Efficient Buildings for the academic year 2017-18 is shown in attachment (Tables “Curriculum - Academic Year 2017-18”).

For each course unit of the curriculum the following information are shown:

- year and semester of delivery;
- ECTS credits;
- lecturer (s).

The curriculum was approved by the Council of the Master.

Course Units

Characteristics of the course units

The characteristics of the course units are reported in attachment (Table “Curriculum - Academic Year 2017-18. Characteristics of the Course Units”).

For each course unit, the following information are shown:

- name;
- number of ECTS credits;
- course year and teaching period of delivery;
- learning outcomes specific of the course unit;
- contents;
- teaching and learning methods, also in terms of hours/credits for each form;
- typologies of educational activities or teaching techniques, also in terms of number of hours/credits for each technique;
- assessment methods;
- assessment criteria;
- assessment metrics;
- criteria of attribution of the final grade, if any;
- preparatory course units, if any;
- educational material of reference.

The definition of the characteristics of the course units is coordinated by the Council of the Master, particularly in order to avoid gaps or superimpositions in the definition of the specific learning outcomes and contents and to assure the suitability of the assessment methods to a correct assessment of the students’ learning.

Characteristics of the graduation exam

The characteristics of the graduation exam are shown in attachment (Table “Characteristics of the Graduation Exam”).

The following information are specified:

- workload, in terms of ECTS credits;
- requirements to be fulfilled by the final work;
- criteria for the attribution of the graduation grade.

Admission, Recognition, Progression and Attestation

Admission

All the students who have overcome a Bachelor-graduating examination of the Department of Mechanical and Energy Engineering can be admitted to the Master in Energy Efficient Buildings.

Recognition

The SP has not established rules for the recognition of higher education qualifications and periods of study and prior learning. The Council of the Master assesses higher education qualifications and periods of study and prior learning, including non- formal and informal learning, case by case. The assessment consists in the comparison of the acquired contents and of the achieved learning outcomes with the contents and learning outcomes of the Master. The Council decides whether and how many credits can be recognized for the applicants on the basis of the results of the comparison.

Progression

Students’ progression in their studies is regulated by the following criteria.

Frequency of the didactic activities

Frequency of the course units is compulsory.

Admission at the successive course year

To be admitted at the 2nd course year students must have accumulated at least 40 ECTS credits.

Training periods outside the University

For carrying out training periods outside the University, students must have accumulated at least 90 ECTS credits.

Admission to the graduation exam

To be admitted to the graduation exam students must have accumulated all the ECTS credits established in the curriculum, except the credits attributed to the graduation exam.

Students who cannot attend the didactic activities for a long period for causes independent from their will

The Council of the Master regulates admission to the exams of students who cannot attend the didactic activities for a long period for causes independent from their willing time by time.

Attestation

After the completion of the studies, the Master provides the graduates with the ‘Diploma’s Supplement’, which explains the qualification gained, including the achieved learning outcomes and the context, level, content and status of the pursued and successfully completed studies.

Teaching staff

The teaching staff of the programme is shown in attachment (Table “Teaching Staff - Academic Year 2017-18”).

For each member of the academic staff, the following information are shown:

- name;
- qualification;
- course units given in the Master;
- course units given in other programmes.

Facilities

Laboratories

The laboratories of the Department of Mechanical and Energy Engineering used by the students of the Master are:

1. Laboratory of Thermodynamics and Heat Mass Transfer
2. Laboratory of Heating Systems;
3. Buildings Simulation

For each of these laboratories, Table “Laboratories” in attachment provides the following information:

- available didactic equipment;
- work places and number of student per work place;
- available technical staff.

Libraries

The students of the Master utilize the library of the Department of Mechanical and Energy Engineering.

Table “Library” in attachment provides the following information:

- Bibliographical material of interest for the didactic activities of the Master;
- Web Connections;

- Services offered;
- Opening time and access rules;
- Librarian staff available.

Partnerships

Partnerships for carrying out training periods outside the University

The list of the active partnerships for carrying out training periods outside the University is shown in attachment (Table “Partnerships for carrying out training periods outside the University”).

Partnerships for carrying out mobility periods

The list of the active partnerships for carrying out mobility periods is in attachment (Table “Partnerships for carrying out international mobility periods”).