

THE MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN
FEDERATION

**Federal state budgetary educational institution
of higher professional education**

**Tambov State Technical University
FSBEI HPE TSTU**



**BRIEF DESCRIPTION
OF THE BASIC EDUCATIONAL PROGRAM
OF HIGHER EDUCATION**

Field of study

08.04.01 – Civil engineering (Master’s level)

Master’s program

08.04.01.01 Theory and design of buildings and structures

Qualification

Master

Form of study

Full-time, part-time

Tambov, 2015

Abbreviations

FSBEI HPE TSTU	– Federal state budgetary educational institution of higher professional education Tambov State Technical University
HE	– higher education
BEP	– basic educational program
GCC	– general cultural competence
PC	– professional competence
UPC	– University professional competence
BEPC	– basic educational program courses
FSES HE	- Federal state educational standard of higher education
C	– curriculum
SP	– study program

1 General

1.1 Basic educational program implemented in the university

The basic educational program implemented in Tambov State Technical University 08.04.01 *Civil engineering* (Master's level) and Master's program 08.04.01.01 *Theory and Design of Buildings and Structures* is a set of documents developed and approved by the institution of higher education to meet requirements of the labour market and comply with the Federal state educational standard of higher education for the field of study 08.04.01 – Civil engineering (Master's level) (approved by the Ministry of Education and Science of the Russian Federation of October 30, 2014, # 1419).

The BEP regulates objectives, learning outcomes, content, conditions and technologies of the educational process, assessment of graduates' progress and quality of education.

1.2 General description of BEP HE

1.2.1 Program objectives

The BEP is aimed at the development of students' personal qualities that contribute to their creativity, cultural growth and social mobility including motivation, self-discipline, diligence, responsibility, independence, commitment to ethical values, tolerance, persistence in achieving goals.

The BEP objective is to help graduates develop general cultural and professional competences to succeed in their professional career and meet the labour market demands.

1.2.2 Program Duration

In compliance with the FSES HE the duration of the BEP 08.04.01– Civil engineering (Master's level) is 2 years.

1.2.3 Credits

In compliance with the FSES HE the total weight of the BEP is 120. It includes all kinds of classroom and independent work, practical work and assessment.

One credit corresponds to 36 academic hours. The academic year for full-time education is equal to 60 credits units.

1.3 Admission Requirements

An applicant must provide a nationally recognized document equivalent to Bachelor's degree certificate (diploma). Admission to university is regulated by the admission rules of the FSBEI HPE Tambov State Technical University for any field of study specified in the BEP HE. The admission test is a university interview covering problems of the chosen Master's program.

2 Description of graduates' professional activity

• 2.1 Scope of graduates' professional activity

- In compliance with the FSES the scope of graduates' professional activity for the BEP HE 08.04.01 – Civil engineering (Master's level) includes:
- design, construction, exploitation and reconstruction of buildings and structures;
- engineering support and equipment for construction projects;

- development of technologies for the construction and production of building materials, products and structures;
- research and educational activity.

2.2.3 Professional work facilities

Professional work facilities in compliance with the FSES HE are:

- industrial and civil buildings, hydraulic engineering works and environmental constructions;
- building materials, products and constructions
- machines, equipment, technological complexes and automation systems used in the process of manufacturing building materials, products and constructions;
- land plots and urban areas.

2.3 Types of graduates' professional activity

In compliance with the FSES HE and the labor market requirements graduates of the BEP HE 08.04.01 – Civil engineering (Master's level) must be ready for the following types of professional activities:

- innovative activity, survey work and preliminary estimation.

2.4 Areas of graduates' professional activity

Graduates of the BEP HE 08.04.01– Civil engineering (Master's level) must be able to solve the following professional problems:

- development of innovative materials, technologies, designs and systems using scientific achievements;
- collection, systematization and analysis of information initial data for design of buildings, structures and engineering systems;
- control of compliance of the developed projects and technical documentation with design tasks, standards, construction norms and rules, technical conditions and other implementation documents;
- organization and improvement of the production process at the plant or site, control of technological discipline, maintenance of process equipment and machines;
- improvement and development of new technological processes of building production, manufacture of building materials, products and constructions, machinery and equipment;
- development and improvement of methods for quality control of construction, manufactured products, provision of metrological support for technological processes;
- development and provision of ecological security;
- organization of commissioning, testing and completion of construction projects, samples of new and modernized products manufactured by a plant;
- study and analysis of scientific and technical information, domestic and foreign experience in this sphere of activity;
- design of technical and scientific tasks, choice of methods and ways to solve them, collection of data for writing reports, scientific articles and other publications;
- arranging and conducting experiments; metrological provision; collection, processing and analysis of results, identification of theory and experiment;
- development and use of databases and information technologies for solving scientific-technical and techno-economic problems related to the specific professional area;
- presentation of the performed work results, practical studies and research outcomes.

3 Graduates' learning outcomes

The learning outcomes are determined by the competences acquired by graduates, i.e. their ability to apply knowledge, skills and personal qualities to meet the goals of professional activities. On completion of the program graduates must develop the following general cultural, general professional and professional competences.

General cultural competences:

- skills of critical thinking, analysis, synthesis (GCC-1);
- readiness to deal with challenging situations, take social and ethical responsibility for the decisions (GCC-2);
- readiness for personal and professional development using creativity and imagination (GCC-3).

General professional competences:

- readiness for communication in oral and written forms in Russian to solve professional problems (GPC -1);
- ability to lead professional teams in the workforce, be tolerant of social, ethical, religious, and cultural differences (GPC -2);
- ability to use skills of organizing research work, managing a team, motivating staff, creating comfortable work environment, evaluating performance, social mobility (GPC -3);
- ability to use knowledge of the fundamental and applied sciences basic for Master's program (GPC-4);
- ability to use advanced theoretical and practical knowledge (GPC -5);
- ability to acquire new knowledge and skills independently with the help of information technologies and use them in practice including new areas of knowledge which are not directly associated with the scope of professional activity; to broaden the scientific world outlook (GPC-6);
- ability to use profound knowledge of legal and ethical norms in the evaluation of the professional activity results, in the development and implementation of socially significant projects (GPC -7);
- ability to use skills in a scientific team, ability to come up with new ideas (creativity) (GPC -8);
- ability to understand basic problems of the subject area using quantitative and qualitative methods (GPC -9);
- ability and willingness to be guided in the formulation of a problem, to apply knowledge about contemporary research methods, to analyze, synthesize and make critical information summary (GPC -10);
- ability and willingness to conduct scientific experiments using modern research equipment and devices, evaluate the results of studies (GPC -11);
- ability to do, present and report the results of the work done (GPC -12).

Professional competences:

innovative activity, survey work and preliminary estimation:

- ability to carry out surveys to evaluate the conditions of natural and technological objects, to determine initial data for designing and justifying calculations and monitoring of objects, to do patent research, to prepare design specifications (PC-1);
- knowledge of methods for the estimation of the innovative potential, risks of the project commercialization, the techno-economic analysis of designed objects and products (PC-2);
- knowledge of methods for designing and monitoring of buildings and constructions, their structural components applying methods of justifying calculations and using universal and specialized software systems and automated design systems (PC-3);
- ability to develop conceptual, technical and working projects of complex objects using CAD (SPC-4).

University Professional competences:

- knowledge of the best international experience related to "green" civil engineering; knowledge of the ways to certify construction projects in compliance with progressive international standards and Russian "green" ones; ability to apply principles of structural engineering using "active" and

"passive" technologies of resources conservation (UPC-1);

- ability to make decisions about space-planning of construction projects with regard to resources conservation technologies and the best international experience in the area;
- ability to choose construction materials that meet all modern standards including those which are complied with in the sphere of environmental safety and resources conservation; knowledge of methods for designing buildings and structures including methods for justifying calculations taking into account resources conservation, biopositive and "green" technologies (UPC -2);
- knowledge of construction materials design principles with the use of recycled waste production; knowledge of the basics for manufacturing construction materials with predetermined properties, including environmentally friendly and energy efficient materials;
- knowledge of the principles to forecast key performance parameters of building materials and designs paying attention to the assessment of their safety; knowledge of the basics of construction materials and structures and the principles of their optimization from the point of view of resources conservation and environmental safety; ability to use basic methods for research of physical, mechanical and technological properties of construction materials (UPC -3);
- knowledge of methods for ecological monitoring of the environment and construction objects; the ability to arrange engineering-ecological surveys for construction; knowledge of the main types of human impact on the environment and natural processes and disasters to which they lead; knowledge of basic causes of industrial accidents in construction complexes and systems and their origin; knowledge of modern methods for diagnostics and monitoring of building constructions with the help of experimental methods for determining stress-strain state of structures; ability to assess the durability and safety of building structures, bases and foundations (UPC - 4);
- ability to assess the environmental safety of construction materials used and their designs; ability to choose the most environmentally friendly production technology of the construction project; knowledge of methods for the evaluation of design projects based on their environmental safety, resource requirements (UPC -5).

4 Program structure

The content and organization of the educational process are regulated by the curriculum, study programs, learning materials, internship plans, the annual academic calendar and the learning resources for the implementation of the educational process ensuring the quality of education.

The curriculum (Appendix 1) includes the following courses (the aims and description of the courses are listed in Appendix 2):

Core courses

1. Russian language
2. Methods for solving scientific and engineering problems in civil engineering
3. Information technologies in civil engineering
4. Structural design and analysis of buildings
5. Efficiency of innovations and innovative technologies in civil engineering

Additional courses

Compulsory courses:

1. Structural durability and reliability
2. Foundation engineering in difficult soil conditions
3. Steel structures
4. Reinforced concrete constructions

Elective courses:

5. Design software for structural design calculation
6. Calculation theory for structural engineering
7. Complex building systems engineering
8. Structural reinforcement (building constructions, bases and foundations)
9. Structural monitoring and reinforcement
10. Automated systems in civil engineering

Practical experience including research work

1. Industrial placement
2. Computer-aided construction internship
3. Experimental research work
4. Work experience internship
5. Research internship

Facilities for getting all types of practical experience specified in the program are provided by the Federal state budgetary educational institution of higher professional education Tambov State Technical University.

In compliance with the BEP the graduation certification is obligatory; the graduate certificate can be awarded upon completion of the entire educational program. Graduation certification includes:

- the state exam;
- the defense of graduate qualification work (Master's thesis).

5 Learning and teaching resources

1.1 Faculty and staff.

The program is delivered by research and teaching staff qualified for teaching courses in 08.04.01 – Civil engineering (Master's program *Resources Conservation and Environmental Safety in Civil Engineering*); all lecturers hold a relevant degree or have a professional experience and are systematically engaged in research and academic work.

The teaching staff have publications in peer-reviewed domestic and foreign scientific journals, proceedings of national and international conferences, symposiums and do advanced professional training or get another qualification in leading research centers, RAS institutes, Russian and foreign universities every three years.

The Graduate Chair for 08.04.01.01 – Civil engineering (Master's program *Theory and Design of Buildings and Structures*) is the Department *Structural engineering*.

The program leader is PhD, Prof. Ledenyov V.V.

5.2 Material resources and technical facilities

The Departments which are responsible for the program implementation have up-to-date material resources and technical facilities ensuring all types of disciplinary and interdisciplinary training, laboratory, practical and research work.

5.3 Information resources

The University library is well-stocked with textbooks and learning materials recommended for the study of programs, methodological instructions to do laboratory work, guidance papers on theoretical and practical problems for all courses and types of classes and all kinds of academic and research activities. Effective information support of research and academic processes is enhanced by the access to a number of electronic library systems. The University also has its own electronic

library system.