The annotation of the master's program "Mathematical analysis and modeling"

Training direction: 01.04.01 Mathematics
Faculty: Mechanical and mathematical
Training form: Full-time education
Duration of the program: 2 years
Language of education: Russian/English/French
Partner University: University of Rouen

Program relevance

Modern high-tech production is in the need of university graduates who have a good understanding of engineering problems of the industry and simultaneously have a strong mathematical background. Such specialists are able to quickly and scientifically reorganize modern production, to change the nature of production, since deeply understand the processes of production from a mathematical point of view. Mathematicians-engineers are needed in such branches of the modern science-intensive industry as follows: nanotechnology, forecasting economic and financial processes, development of digital twins and software, artificial intelligence, supercomputer engineering modeling in mining, energy, space and other industries.

This program corresponds to the priority areas of global, national and regional development: information and telecommunication systems, nanosystems industry, applied science and scientific support industry, development of high-tech industries based on potential of the scientific and educational complex.

The master's program is ready to make up qualification deficits in engineers, mathematicians, mathematicians-programmers, mathematicians-researchers in the above-mentioned branches of the scientific and industrial sphere.

The program certainly corresponds to modern scientific problems, since along with the study of advanced science-intensive disciplines: functional analysis, mathematical modeling in science and technology, supercomputer technologies, machine learning, modeling in nanotechnology – involves a large amount of research work on modern scientific topics: data Science, mathematical modeling of technological processes, machine learning, high technology programming.

Innovative value of the program lies in the fact that after its development a specialist is graduating (Master) with competencies in the relevant field of production activities and with good mathematical background.

Moreover, the program is designed for teaching both Russian and foreign students, because it can be implemented in Russian, English or French.

Since the program involves an exchange, students develop not only professional competencies, but also so-called soft skills. Both students and staff learn and implement new training methods that contribute to the improvement of competencies both in intercultural and at a professional level. This opportunity builds bridges between students and the professional world, contributing to the improvement of opportunities employment of students, both in the Russian Federation and abroad.

The received professional competencies develop through courses offered in small groups and specific real cases, as well as opportunities for students to complete an internship at writing a master's thesis.

Mission of program

Target audience consists from highly motivated applicants with high level of knowledge of a foreign language, with quality training and initial soft skills level.

The field of professional activity of graduates of this master's program includes the solution of complex problems in scientific and research activities in academic institutions and innovative organizations using mathematical methods and computational technologies for solving fundamental and applied problems of mathematical modeling of processes and objects, Data Science.

The program implements courses that contribute to format ideas and basic skills to implement the full cycle of mathematical modeling using theoretical mathematics and modern computer technology to obtain innovative product and translation of the resulting developments to the market high technology services.

Companies which engage in science-intensive production in the mining, processing, information technology fields of activity, scientific organizations annually apply to Mechanical and mathematical faculty of TSU for specialists, having competencies in mathematical analysis and modeling.

It can be listed among them: Gazprom Transgaz, SIBUR, Rosatom, Elecard, Econophysica, Vostogazprom, CJSC SIAM, Institutes of the Russian Academy of Sciences.

Prospects for employment, professional and scientific activities

Graduates of the master's program have the opportunity to be employed in partner organizations of the Mechanical and mathematical faculty of TSU and European universities, as well as to continue research in graduate school.

Specifics of the content and implementation of the program

The share of teachers with an academic degree and (or) academic title, in the total number of teachers providing the educational process in master's program, is 90 percents.

Share of teachers from among current managers and employees of specialized organizations (having at least 3 years of work experience in this professional field) is 10 percents.

At present, the Mechanical and mathematical faculty has a high, constantly developing, personnel potential in the field of mathematics, mechanics, mathematical modeling and computer science.

There are a number of recognized authoritative scientific and pedagogical schools, carrying out educational and scientific activities at the global level, including:

1. School of Mathematical Analysis (Department of Mathematical Analysis and theory of functions MMF TSU, prof. Gulko S.P.)
2. School of Parallel Computer Technologies (Department of Computing mathematics and computer modeling MMF TSU, prof. Starchenko A.V.)
3. School of probabilistic and statistical methods and their applications (Department of Mathematical Analysis and Theory of Functions MMF
4. International laboratory of statistics of random processes and quantitative financial Analysis TSU - University of Rouen (France), Federal Professor of mathematics, prof. Pergameshchikov S.M.)
5. School of Engineering Mechanics and Thermal Physics (Department of Theoretical mechanics MMF, prof. Sheremet M.A.).

The personnel composition of TSU in the direction is enhanced by attracting educational process (lectures, seminars, attestation commissions etc.) leading domestic and foreign scientists (including those from partner universities) and enterprise specialists.

It should be noted that HR potential is most actively enhanced by partner companies region (SIAM, Tomsklab, Econophysica LTD, etc.).

To active scientific research work at TSU in the field of mathematics, mechanics, mathematical modeling and computer science attracted dozens students.

All this allows us to conclude that the staffing level of TSU is high in the region as highly qualified experienced personnel, and promising young scientists.

Program partners

Signed Framework Agreements and Program Implementation Agreements:

1. University of Rouen, France
2. University of Augsburg, Germany
3. University of Napoli, Italy
4. University of Seville, Spain

Planning program partners

1. University Federal of Paraiba, Brazil
2. University of the Philippines, Diliman
3. Italian Mathematical Society
4. Southeast Asian Mathematical Society (Asian countries – Singapore, Vietnam, Malaysia etc.).

Organizations - partners of faculty

1. Company "SIAM" (Tomsk) – mathematical modeling of transportation problems and oil and gas production
2. Tomsklab LLC (Tomsk) – development of mathematical methods and software for image recognition
3. Research Institute for Monitoring Climatic and Environmental systems (the Tomsk Science Center of Siberian Branch of Russian Academy of Sciences) – development of mathematical models in subject areas
4. Research Institute of Atmospheric Optics, the Tomsk Science Center of Siberian Branch of Russian Academy of Sciences) – development of mathematical models in subject areas
5. Company Novatek (Moscow) – mathematical modelling of oil reservoirs
6. Company Econophysica LTD (Tomsk, Moscow, London) – mathematical modeling of financial activity

Program concept

The program is carried out as follows. At the 1st and 2nd semesters students study at the Tomsk State University on the master's program "Fundamental mathematics". The curriculum includes general professional and specialized disciplines (for example, industrial mathematics, optimization methods, supercomputer technologies, etc.) along with an in-depth study of the English language.

At the 3rd and 4th semesters in accordance with the schedule of the European Partner University in the direction of "Fundamental and Applied Mathematics" the curriculum includes specially-oriented disciplines, foreign languages, industrial practice.

During the 2nd year of study, the student also works on a master's thesis in parallel with studies.

The preparation and a defense of a master's thesis take place at one of the partner universities (Tomsk State University, University of Rouen).

Educational and research activities are carried out in accordance with the student's individual plan with the participation of a supervisor.

Program Goals

The master's program is designed to train highly qualified specialist who are capable of carrying out design, information-analytical and research activities in Russian and European commercial organizations and research centers.

Demand for program graduates

A graduate of the master's program are ready to work in high-tech and industrial companies, for example, Alcatel, IFP Energies Nouvelles, Continental Automotive France, SNCF, Michelin, Le Groupe Renault, Le Groupe EDF, SIAM, TomskNIPIneft.

Admission rules

The prerequisites for admission to the program are a good knowledge of English and a bachelor's degree or a diploma in mathematics or engineering.

The applicant must also submit:

letters of recommendation from the last place of study (work), motivation letters.

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Program site:
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