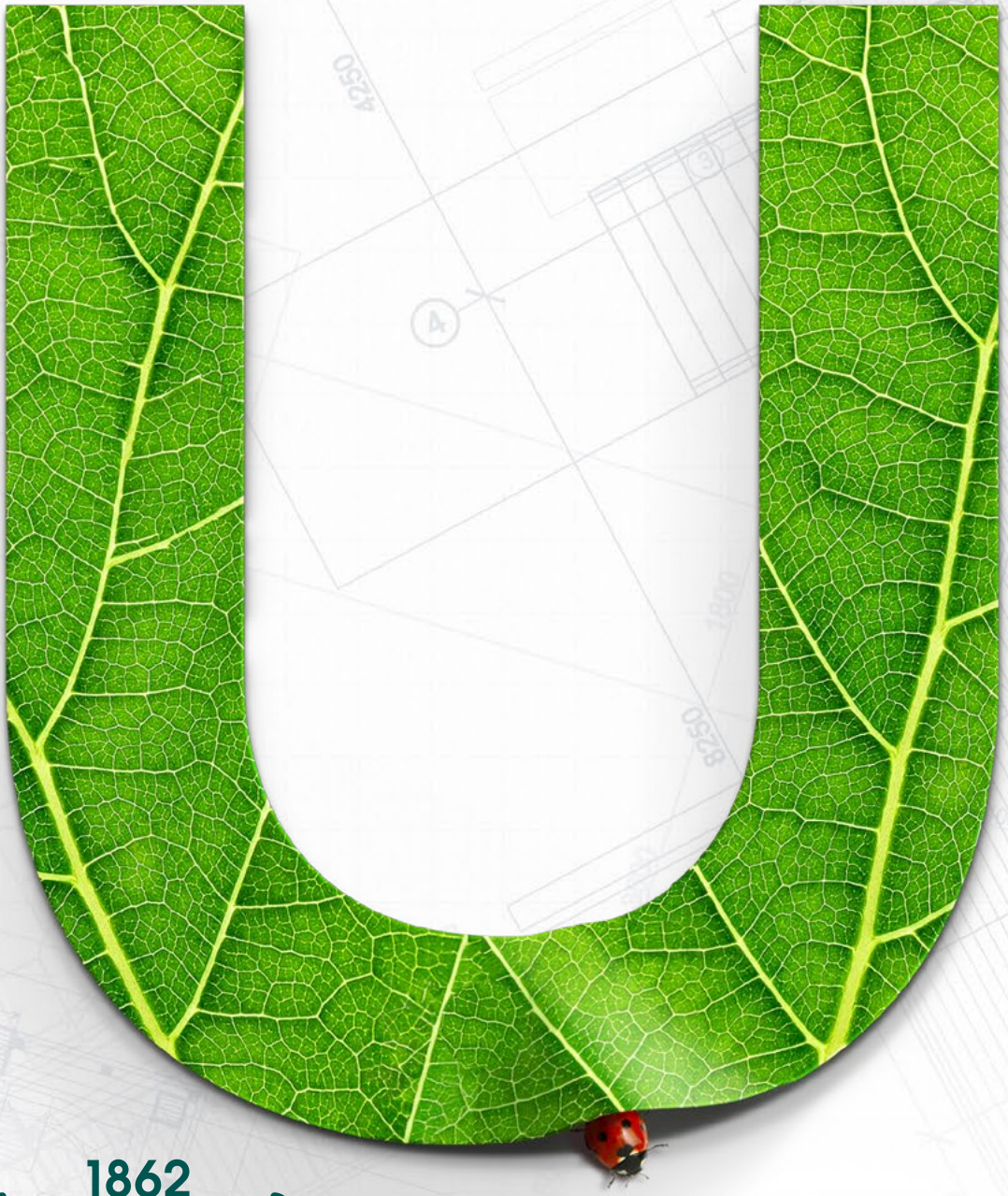
GREEN TECHNOLOGIES



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RIGA TECHNICAL UNIVERSITY

MAGNETIC LATVIA

RIGA TECHNICAL UNIVERSITY

is the largest technological university in the Baltic States with rich history and clear future vision aimed at promoting excellence in student academic results, research, and global issues in cooperation with the industry and foreign partners.

STUDIES:

Studies at RTU are implemented by 9 faculties, including 33 institutes.

RTU has 4 affiliations, it comprises Riga Business School, BALTECH — a consortium of seven engineering universities from the Baltic Sea Region, as well as Engineering High School.

PROGRAMMES: 49:

RTU offers academic and professional study programmes in English at 3 levels:

13 undergraduate

24 post graduate

12 doctoral studies

FACULTIES

INCLUDING **33** INSTITUTES

RESEARCH

Research at RTU is organized on six research platforms:

6

- Energy and Environment;
- Cities and Urban Development;
- Information and Communication;
- Transport;
- Materials, Processes and Technologies;
- Safety and Security.

RESEARCH CAPACITY:

833 researchers | **30** laboratories

Advanced infrastructure, innovation and technology transfer, cooperation with the industry.

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2017

RESEARCH PUBLICATIONS in 2017:

1659 RTU publications/ in total indexed

900 indexed in SCOPUS data base

728 indexed in ISI Web of Knowledge data base

FACULTIES

- Faculty of Architecture,
- Faculty of Civil Engineering,
- Faculty of Computer Science and IT,
- Faculty of E-Learning Technologies and Humanities,
- Faculty of Electronics and Telecommunications,
- Faculty of Power and Electrical Engineering,
- Faculty of Engineering Economics and Management,
- Faculty of Mechanical Engineering, Transport and Aeronautics,
- Faculty of Materials Science and Applied Chemistry.

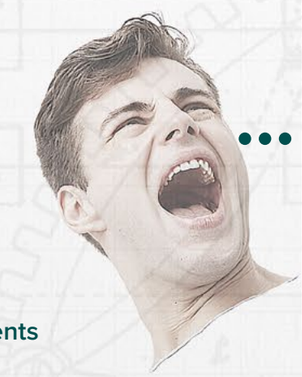
MAIN FIGURES:

14 672 total number of students

2 353 international students

563 number of doctoral students

36 doctoral theses defended in 2017



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RĪGAS TEHNISKĀ UNIVERSITĀTE

2018

PATENT PORTOLIO

88
National (Latvian) patents in force

26
National (Latvian) patents filed

9
European patents in force

PROJECT PORTFOLIO

From 2008 till 2017, RTU has been involved in the implementation of 34 EU 7th Framework Programme (FP7) projects and 17 Horizon 2020 Programme projects.

38
EU Structural Fund projects

34
International research projects

8
International cross-border research project

29
State funded research projects

THINK GLOBAL, BE GLOBAL!

INTERNATIONAL COOPERATION

RTU is highly active in international affairs. The University is open to cooperation with foreign partners, it hosts guest delegations to launch joint projects and organize exchange of good practices.

With a slogan “Think global, be global!” RTU positions itself in the global education market as a modern university open to international cooperation.

RTU is represented at the largest European and world education networks and actively participates in the work of specialized associations:

- **European University Association — EUA;**
- **European Society for Engineering Education — SEFI;**
- **European Association for International Education — EAIE;**
- **Association for International Educators — NAFSA;**
- **The University Consortium for Science and Technology — BALTECH;**
- **Baltic University Programme – BUP;**
- **The Association «European Universities;**
- **Public Relations and Information Officers — EUPRIO;**
- **Romualdo Del Bianco Fund – Life Beyond Tourism;**
- **Baltic Sea Region University Network – BSRUN.**

RIGA TECHNICAL UNIVERSITY

GREEN TECHNOLOGIES

INSTITUTE OF ENERGY SYSTEMS AND ENVIRONMENT

Institute of Energy Systems and Environment has become a leader of environmental science and engineering in Europe.

Main research directions:
— Increasing energy efficiency of energy end-user;
— Production and use of renewable energy resources and related environmental aspects;
— Fuel combustion technologies;
— Climate technology solutions;
— Eco-design and life cycle assessment;
— Socio-economic aspects of energy planning and un energy supply.

Projects:
— BioWALK4Biofuels. Production of the second generation biofuels from biowaste and algae. FP7;
— Accelerate SUNShINE. Save your building by saving energy. H2020;
— SUNShINE. Energy Efficiency in Renovated Apartment Buildings. H2020;
— IFUS. Individual Heat Supply with Integrated Fog Unit System. ERDF;
— LowTEMP. Low Temperature District Heating for the Baltic Sea Region. Baltic Sea Region;
— Flex4RES. Flexibility for Variable Renewable Energy Integration. Nordic Energy Research;
— BIOCM. Bio-Empowered Oxidative Coupling of Methane Process. ERANet-LAC.

POINTS OF EXCELLENCE

FLUE GAS CONDENSER
The innovative device has to be classified as a direct contact two-stage flue gas heat exchangercondenser (hereinafter-the condenser). The condenser was developed to boost heat production efficiency and to reduce harmful emissions in boiler equipment where wet biomass or peat is used as fuel. Depending on the fuel moisture a heat supply system and number of parameters, condenser, makes it possible to reduce fuel consumption by 10% -30% and correspondingly to increase the boiler house capacity, while reducing harmful substances in waste gases (sulphur compounds, chlorides, hard metal particles, ash particles, water soluble oxides), and by reducing particulate emissions by more than 90%. The flue gas condenser also performs the function of the chimney, so there is no need for a separate chimney. In most cases also separate filter is not needed. Adaptations and maintenances of device are simple and inexpensive.

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RESEARCH LABORATORY OF FUNCTIONAL MATERIALS TECHNOLOGIES

Research directions:
— Triboelectric nanogenerators;
— Piezoelectric nanogenerators;
— Photocatalysts.

Projects:
— Plasmonic oxide quantum dots for energy saving smart windows. The goal of the project: Switchable light absorption by combining photochromic and electrochemical processes on TiO_2 quantum dots, thus providing energy management for modern buildings and transportation;
— Polymer/aligned carbon nanoparticle composites for smart systems. The goal of the project is to elaborate advanced materials for sensors and actuators;
— Photonic hybrids with tunable optical properties. The project aims at development of novel colorimetric hybrids composed of visible light absorbing nanowires dispersed in organic polymer matrix. Depending on initial physical state of organic matrix, interactions between nanowires and organic matrix, as well as orientation of nanowires (disordered or aligned), colour changes in the hybrids can be induced by different external factors like mechanical deformation, electrostatic field or volatile organic chemicals (chemical stimulus). The results of the project can be used to develop novel stimuliresponsive hybrid optical materials for intelligent devices for sensing, construction and safety applications, and also for touch sensitive displays and "smart" glass.

POINTS OF EXCELLENCE

INTELLIGENT MATERIALS – PHOTOCATALYSTS
Intelligent materials help purifying chemically or biologically polluted water.
Researchers of the Research Laboratory of Functional Materials have developed a photocatalyst, which in an innovative way purifies chemically or biologically polluted water.

RTU researchers have synthesized intelligent materials (photocatalysts), which act as an active ingredient in the sunlight, turning chemical or biological water pollution into clean water and carbon dioxide. Photocatalyst looks like a brown powder. It has not only pollution elimination properties in the sunlight, but also magnetic properties, which allows the photocatalyst to be separated from the purified environment and used repeatedly.

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WATER RESEARCH LABORATORY

Water Research Laboratory was started up in 2000. It gathers expertise in water and wastewater engineering and renewable energy production technologies in cooperation with industrial partners and end-user organizations.

Research directions:

— Treatment technologies for both groundwater and surface drinking water like coagulation, filtration and disinfection;
— Drinking water quality control and improvement in distribution network, including quality modeling;
— Advanced treatment methods applicable for drinking water (electrodisinfection, Fenton reaction) and wastewater sector (electrocoagulation, treatment of industrial wastewaters with fungal technologies);
— Development and application of molecular methods in drinking water and bioenergy field to control and detect microorganisms/pathogens with rapid molecular methods as core competence;
— Biotechnology methods such as biofiltration, biostimulation and adaptation mechanisms in microbiological systems;
— Enzymatical hydrolysis process as a part of cost-effective and sustainable advanced biofuel production from lignocellulosic biomass;
— Technologies for biogas production and enrichment from residues in food and agricultural industry.

Major projects:

— Efficient and affordable water treatment technologies to minimise waterborne diseases. Hi-Water.
— Development of an Integrated Process for Conversion of Biomass to Affordable Liquid Biofuel. B-LIQ.
— Pilot watersheds as a practical tool to reduce the harmful inflows into the Baltic Sea. WATERCHAIN.
— Alternative use of biomass for maintenance of grassland biodiversity and ecosystem services.
— Security and decontamination of drinking water distribution systems following a deliberate contamination. SECUREAU.

POINTS OF EXCELLENCE

FOOD STAFF QUALITY DIAGNOSTICS

The methodology for testing of food staff quality allows determining the presence of fungi and mould in the product in just 30 minutes. In comparison, microorganism testing methods currently used in the industry provide similar test results in 24 hours, or even longer.

RENEWABLE ENERGY TECHNOLOGY

Top technology, which enables fuel to be produced from plant biomass and producing biogas from dairy processing by products.

Technology offers environmentally friendly production of a second generation biofuels from lignocellulosic biomass not intended for human consumption (agricultural waste, weeds, straw, wood-processing waste). Technology allows producing fuel also from hogweed, the plant that is ranked among the most dangerous invasive species in Latvia, its leaves may cause burns and blistering if come into physical contact. The technology is applicable to production of both bio-ethanol or bio-butanol.

The technology is applicable to both large and small scale production systems (local farms, food processing companies) and can be introduced as a secondary unit within other bioenergy production systems, e.g., biogas plants.

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