Silesian University of Technology

RESEARCH UNIVERSITY
EXCELLENCE INITIATIVE

SILESIAN UNIVERSITY OF TECHNOLOGY

SCIENCE - PRESTIGE - INNOVATIONS

www.polsl.pl

78 years of tradition

- Founded in 1945 - the oldest technical university in the region and one of the largest in the country
- The only technical university in the only Metropolis in Poland
- Upper Silesia's only laureate of the Excellence Initiative - Research University Ministry of Education and Science competition
- Part of the European University Initiative with 8 other institutions from the EU
- Diverse and inclusive – HR Excellence in Research Award since 2017

SUT in numbers

over 15,600
students

over 680
PhD students

over 220,000
graduates

12
scientific disciplines

6
priority research areas

over 1,640
academic staff

over 120
full-professors

over 3,150
employees

STRUCTURE

4 campuses (Gliwice – main seat, Zabrze, Katowice, Rybnik)

13 Faculties and 1 Institute

- Faculty of Applied Mathematics
- Faculty of Architecture
- Faculty of Automatic Control, Electronics and Computer Science
- Faculty of Biomedical Engineering
- Faculty of Chemistry
- Faculty of Civil Engineering
- Faculty of Electrical Engineering
- Faculty of Energy and Environmental Engineering
- Faculty of Materials Engineering
- Faculty of Mechanical Engineering
- Faculty of Mining, Safety Engineering and Industrial Automation
- Faculty of Organization and Management
- Faculty of Transport and Aviation Engineering
- Institute of Physics - Centre for Science and Education

Joint Doctoral School (12 disciplines)

formed by the Silesian University of Technology in cooperation with:

- GIG Research Institute,
- Institute of Theoretical and Applied Informatics, Polish Academy of Sciences,
- Institute of Environmental Engineering of the Polish Academy of Sciences,
- Centre of Polymer and Carbon Materials of the Polish Academy of Sciences,
- Maria Skłodowska-Curie National Institute of Oncology - National Research Institute

MAIN STRATEGIC GOALS OF THE SUT DEVELOPMENT

RESEARCH

Conducting high quality, world-class research and innovation

EDUCATION

Providing high-quality education for students and at The Joint Doctoral School based on research, science and innovation

COOPERATION

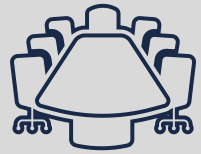
Exploiting the opportunities offered by the university's location and expanding R & D cooperation with partners from the socio-economic environment.

INTERNATIONALISATION

Increasing internationalization of science and education

HUMAN CAPITAL

Supporting scientific and professional development of employees and students



MANAGEMENT

Raise the quality of the University management and implementing pro-quality changes

EXCELLENCE INITIATIVE –
RESEARCH UNIVERISTY

Laureate status in the first competition of the Ministry of Education and Science within the programme of the Excellence Initiative - Research University (IDUB)

Main objectives of the development plan under IDUB:

- **Increasing the impact of research activity of the SUT on the development of science**
- **Strengthening research cooperation with leading international research centres**
- **Development of modern education methods (Project-Based Learning) and dual degree programmes**
- **Strengthening human resources policy and the quality of university management**
- **Investment of nearly 245 million over 7 years to improve indicators of scientific excellence**

RESEARCH UNIVERSITY
EXCELLENCE INITIATIVE
Ministry of Science and Higher Education

EUROPEAN UNIVERSITY

EURECA PRO

These 9 partners joined forces to enable students and staff to study, teach, research and collaborate in all the fields, with the long-term goal of a joined virtual and integrated European campus until 2040. This innovative initiative of recognized universities aims in enhancing broadly understood environmental protection especially through responsible production and consumption and quality education.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

EURECA-PRO

Co-funded by the Erasmus+ Programme of the European Union

EUROPEAN UNIVERSITY

EURECA PRO

EURECA-PRO vision and ambition charts the way towards a more inclusive, borderless European Higher Education Area, where freedom, free mobility, civic engagement, equal participation and transparent joint governance allow for the development of shared fundamental philosophies, common values and solution-oriented approaches regarding social cohesion, responsible citizenship and humanhood as well as responsible systems design.

EURECA-PRO

Co-funded by the Erasmus+ Programme of the European Union

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

SCIENTIFIC POTENTIAL OF THE SILESIAN UNIVERSITY OF TECHNOLOGY

12 scientific disciplines

1600+ research staff

6 Priority Research Areas

320 + industrial property rights obtained including national and European patents, trademarks and industrial rights

25%+ sci. articles in 2019-2022 are published in Top 10% journals
Journal Percentiles by CiteScore Percentile (according to SciVal database - Elsevier)

70+ scientific events per year

PRIORITY RESEARCH AREAS

Computational oncology and personalized medicine

Artificial intelligence and data processing

Materials of the future

Smart cities and future mobility

Process automation and Industry 4.0

Climate and environmental protection, modern energy

POB 1 Computational oncology and personalized medicine

Main research topics:

- Integration of engineering sciences with medicine and biology to significantly improve diagnosis, planning and monitoring and to develop new research platforms to better understand the causes and evolution of disease

- The effective integration of mathematical modelling methods, artificial intelligence algorithms and advanced knowledge of molecular biology in research on early stage cancer diagnostic tests, novel methods in imaging informatics or drug pharmacodynamics

SUB-AREAS:

- 1.1. Computational oncology
- 1.2. Personalized medicine
- 1.3. Biomaterials and medical biotechnology
- 1.4. Imaging informatics and telemedicine
- 1.5. Biomechanics
- 1.6. Analysis and drug design
- 1.7. Public health

POB 2 Artificial intelligence and data processing

Main research topics:

- **Research on the development of artificial intelligence methods,**
- **Data processing and analysis,**
- **Exploration of new applications of AI in fields such as medicine, cyber security, construction, architecture, chemistry and other industrial technological processes**

SUB-AREAS:

2.1. Digital Images

2.2. Sound and Vibration

2.3. Development of artificial intelligence methods and knowledge engineering

2.4. Cybersecurity

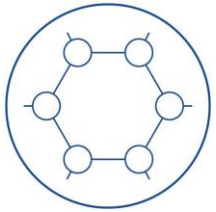
2.5. Bioinformatics and medicine

2.6. Devices, technological processes and computer networks

2.7. Time series in movement analysis and business analytics

2.8. Social and ethical aspects of artificial intelligence

POB 3 Materials of the future



Main research topics:

- conceptual analysis and experimental research aimed at obtaining new materials with desired properties, with particular emphasis on the prospects for their technological applications

- development of advanced materials to improve human well-being and quality of life, solving major problems of civilisation in terms of energy, water, food, climate etc.

SUB-AREAS:

- 3.1. Organic and inorganic materials for electronics
- 3.2. Ultralight and highly resistant materials in automotive and aviation structures
- 3.3. Modern materials for construction applications
- 3.4. Modern materials for medical applications
- 3.5. Advanced methods of material surface modifications
- 3.6. Modelling and testing of physicochemical properties of materials

POB 4 Smart cities and future mobility

Main research topics:

- Identifying and addressing needs in relation to existing infrastructure, technological and spatial developments

- Creating opportunities to overcome contemporary barriers, improve the efficiency of implemented solutions and reduce the negative impact of the expansion of human activity on the environment and on people's quality of life

SUB-AREAS:

- 4.1. Spatial information systems in the city of future
- 4.2. Architecture and environmental engineering
- 4.3. Materials, structures and calculation methods
- 4.4. Social dimension of a smart city
- 4.5. Modern means and transport systems
- 4.6. Modeling, control and automation of future mobility processes and systems

POB 5 Process automation and Industry 4.0

Main research topics:

- Information technology development, big data processing, cloud computing, cyber security, Internet of Things and horizontal and vertical integration,
- Industrial process simulation, design and construction, virtual and augmented reality, 3D printing, reverse engineering and rapid prototyping
- The socio-cultural challenges of Industry 4.0

SUB-AREAS:

5.1. Automation of production processes, industrial automation

5.2. Robotization of production, including mobile robotics

5.3. Digitization and applications of information technologies

5.4. Simulation and modelling of processes

5.5. Management systems

5.6. Technical diagnostics and maintenance systems

5.7. Applications of virtual and augmented reality

5.8. Reverse engineering, rapid prototyping, 3D printing

5.9. Socio-cultural and methodological challenges of Industry 4.0

5.10. Designing and constructing

5.11. Digital transformation

5.12. Methods of rapid prototyping of control systems

POB 6 Climate and environmental protection, modern energy

Main research topics:

- **Research and implementation of the most effective sustainable development strategy targeting a zero-carbon system**
- **Climate change mitigation and the energy sector as a key industry in shaping the socio-economic system**

SUB-AREAS:

- **6.1. Climate and environmental changes and reduction of air pollution**
- **6.2. Water and wastewater management and environmental biotechnology**
- **6.3. Circular economy**
- **6.4. Renewable and alternative energy sources and prosumer energy**
- **6.5. Innovative technologies and sustainable development**
- **6.6. Education for sustainable development and shaping environmental awareness**
- **6.7. Problems of degradation and revitalization of areas**
- **6.8. Energy efficiency and energy management**
- **6.9. Energy storage and hydrogen energy**
- **6.10. Shaping the internal environment and intelligent buildings**
- **6.11. Strategy for sustainable development of energy and gas energy**
- **6.12. Nuclear energy**

RESEARCH CENTRES

- European HealthTech Innovation Centre
- Biotechnology Centre
- Centre for Advanced Security and Defence Technology
- Centre for Climate and Environmental Protection
- Centre of the Industry 4.0
- Centre for Organic and Nanohybrid Electronics
- Silesian Aerospace Technology Laboratory
- Central and Eastern Europe Civil Aviation Personnel Training Centre

STUDIES

3 study level
- Bachelor, master and doctoral
- Double diploma programmes

60+ degree programmes
- 49 frist-cycle studies
- 14 second-cycle studies
- 12+ in English

Joint Doctoral School
- 12 scientific disciplines
- Implementation doctorates

Project-Based Learning
and Mentoring Programme

SUT – LEADER IN MODERN EDUCATION METHODS

DUAL STUDIES

- **Learning by doing**

Close coopertaion of the University with company
Conducted in 5 fields of study: mechanical engineering, materials engineering, logistics, railway transportation and mechatronics

- **PROJECT BASED LEARNING – PBL**

Motivated by the topics obtained from industry or foreign partners. 405 PBL projects were implemented in 2020-2021

- **PATRONAGE COOPERTAION IN GIVEN FIELDS OF STUDY**

SEW-Eurodrive Poland Ltd., IBS Poland, MESCO, PREVAC, Smart Nanotechnologies and many more.

SUT – LEADER IN NUMBER OF STUDENT SCIENTIFIC ASSOCIATIONS

190+ Student Scientific Associations

Silesian Greenpower

Elektra

Smart Power

High Flyers

Silesia Automotive

COOPERATION WITH BUSINESS ENVIRONMENT

IMPLEMENTATION DOCTORATES

- Close cooperation with industry
- Research is conducted under the supervision of the employer with which the doctoral student is employed
- Practical application of the results in industry and business
- A leader in obtaining funds for implementation doctorates- 260 implementation doctorates in 2019-2022

MBA, POST GRADUATE STUDIES AND DEDICATED COURSES

Interdisciplinary programme of advanced managerial competences

MBA profiles at the SUT:

- **Industry 4.0**
- **Hydrogen technologies and energy transition**
- **Public services**

Conducting postgraduate studies launched in cooperation with business partners

Courses and trainings responding to the needs of the industry

RESEARCH AND SCIENTIFIC WORK

Implementation of scientific and research works commissioned by external entities, primarily partners from industry

A steady increase in the number of scientific and research works commissioned form the industry

In the years 2019-2022, University employees obtained 1334 scientific and research works with a total value of PLN 56 497 342

The highest value of acquired works in the 2019-2022 was achieved in the following areas:

- Materials engineering,
- Environmental engineering,
- Mechanical engineering,
- Electrical engineering, electronics, information engineering,
- Biomedical engineering
- Other technical and engineering sciences

PROJECTS

HPK
Polska Południowo-Zachodnia

Horizontal Contact Point

- **Brokerage centre that allows scientists to pair with entrepreneurs in the region in the field of international projects.**
- **Organizational and information suport in preparation of scientific teams from the Silesia and Opole region for effective participation in European Union programmes.**

CZP

Project Management Centre

- **Support of scientists and entrepreneurs in acquiring cooperation partners in order to apply for joint implementation of national and international projects.**
- **Consulting on the preparation and project implementation for partners, including enterprises.**

KNOWLEDGE COMMERCIALISATION

100
INNOVATIONS

The Silesian University of Technology - through the Center for Incubation and Technology Transfer (CITT) - establishes and maintains relations between the University's scientists and enterprises.

CITT helps scientists establish industry partnerships, order and submit materials, apply for EU framework programmes, funds, grants, commercialize technology, and incubate new businesses.

PROVIDING THE DATABASE OF LABORATORIES AND APPARTUS

- Using the research infrastructure of the Silesian University of Technology to conduct scientific research or development work

- Unique e-repository of University's technologies, experts, apparatus and laboratories

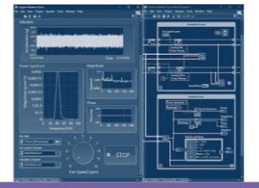
LABORATORIES ESTABLISHED IN COOPERATION WITH THE INDUSTRY

- The ALSTOM laboratory, created in cooperation with Bombardier (today ALSTOM), is equipped by ALSTOM Poland with the latest computer hardware and software in the field of railway traffic control systems, intelligent systems and cyber security.

- Students can train here and develop their skills in implementing safe solutions in the area of intelligent transport, including railway control and signalling systems.

LABORATORIES ESTABLISHED IN COOPERATION WITH THE INDUSTRY

LabVIEW



LabVIEW software for all employees, student laboratories and students at the Silesian University of Technology under the license agreement NATIONAL INSTRUMENTS SOFTWARE LICENSE AGREEMENT. :

- Control, Simulation and Mechatronics Software
- Embeded Systems Software
- Signal and Image Processing Software
- RF and Wireless Communication Software
- Extended Development Suite
- LabView Professional Development System for Mac OS X 10.3 or later
- LabView Professional Development System for Linux
- LabVIEW Basics – educational materials

NATIONAL INSTRUMENTS

LABORATORIES ESTABLISHED IN COOPERATION WITH THE INDUSTRY

APTIV

- The APTIV Electronics Laboratory was opened in 2019.
- Its main task is to carry out research in the field of broadly understood automotive electronics jointly by students, scientists and employees of the APTIV company.
- The laboratory has been equipped by the APTIV company with the latest measuring equipment, including: multi-channel oscilloscopes, multimeters, power supplies, signal generators, evaluation kits, soldering stations, computers.

LABORATORIES ESTABLISHED IN COOPERATION WITH THE INDUSTRY

APAGROUP
YOUR TECHNOLOGY. REINVENTED.

Leonardo Lab combines science with business and gives hope for groundbreaking projects in the near future

- enables interdisciplinary research on the problems of human functioning in the engineering, clinical and social aspects
- enable the testing of prototypes of products and technologies for their production.

THANK YOU FOR YOUR ATTENTION!

SUT – a university focused on excellence in research, modern education, and high impact on society and economy.

Silesian University of Technology

RESEARCH UNIVERSITY
EXCELLENCE INITIATIVE

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