Research in the University of Tartu
The University of Tartu is the only classical university in Estonia. Founded in 1632 by the King Gustav II Adolf of Sweden, it is one of the oldest universities in East Europe. The research and teaching work of the university’s nine faculties, five colleges and several research and development institutions is grouped into four main areas: realia et naturalia, medicina, socialia and humaniora.

The University of Tartu accounts for more than a half of Estonia’s national research output, including over 800 science projects led by UT, over 2700 publications authored or co-authored by UT researchers, and around 90 doctoral degrees conferred by the university each year. UT research projects receive approximately 50% of total annual allocations the state makes available to research.

The University of Tartu is the leading university of Estonia and the centre of academic life, culture and high-technology innovation of the nation. UT aims to become an internationally recognised research university.

The university’s research groups are involved in many cooperation projects with top scientists and research institutions all over the world. UT is a member of the Coimbra group, an association of European multidisciplinary universities of high international standard and venerable traditions.
UT aims to be part of the global research and development process and to contribute to the development of society by solving practical problems in Estonia and the world. In pursuit of this aim, UT cooperates with other universities, governmental institutions, local authorities and businesses. For example, Science Park was founded as a partnership between the city of Tartu, Tartu County, the Estonian University of Life Sciences and the UT Institute of Physics.

The Estonian Genome Project promotes genetic research and collects data on the health and heredity of Estonia’s population. The data bank of the Genome Project will soon include information on 3.5% of the country’s population. As such, it will amount to a body of data that is highly attractive for researchers. The Genome Project has put Estonia among the few countries in the world map of genetic research.

The UT Library contains 3.7 million stock units and offers access to numerous electronic journals and research databases. It is the largest and most representative scientific library in Estonia. The wide array of resources at the disposal of UT’s museums and the Botanical Gardens is also available for research and teaching. The AHHA Science Centre uses interactive and entertaining methods which draw on the excellent research tradition of the university to raise science awareness among the Estonian public. The purpose is to overcome common prejudices regarding science and learning.
The university’s success in research and development is based on its academic competence, modern infrastructure and extensive internal and external collaboration networks of the university’s research teams and units.

According to Essential Science Indicators, UT has reached the top 1% of the world’s most-cited universities and scientific institutions in the following fields:

- Environmental Sciences & Ecology
- Clinical Medicine
- Plant & Animal Sciences
- Chemistry
- Social Sciences, General

Centres of Excellence

World-class research is also done in specialised centres of excellence. UT participates in six out of seven national centres of excellence designated for 2008-2013, being the lead institution in four of those centres. All centers have been conceived as interdisciplinary from the very start.

Cultural Theory

Eight research groups are working together at the Centre of Excellence in cultural theory to search for connections between viewpoints in different disciplines such as ancient social and cultural systems, folklore heritage, contemporary everyday practices, evolution and translatability of sign systems, landscape and sociological processes, media and life story research etc. The centre’s researchers also engage in comparative studies of unique materials from the Estonian cultural history.

http://www.ut.ee/CECT/eng.html

Chemical Biology

One of the most pressing health concerns in the world is the spread of infectious diseases.

The Centre of Excellence in Chemical Biology boosts top level research for providing tools to study and fight against infectious diseases. Research focuses on rapidly spreading infectious diseases such as HIV or tuberculosis, which are characterized by resistance to treatment and represent a major concern for society. A team of scientists in Tallinn synthesizes chemical compounds, which are tested by the team in Tartu for impact on infections. This work will hopefully lead to finding effective remedies against various infectious diseases.

http://www.cecb.ut.ee/indexeng.htm
Translational Medicine

Growing pressure of environmental and socio-psychological factors in modern society burdens our main host defence organ systems, neural and immune system, with a number of serious consequences. The centre’s six research groups seek to answer the questions as what contributes to disorders in the immune and the nervous system, what is the role of genes and environment in these types of diseases or how to diagnose and prevent neuroimmunological diseases. The ultimate goal is to reduce the burden of such diseases by translating the achievements of fundamental research into clinical practice.

http://biomedicum.ut.ee/cetm/?lang_id=4

Frontiers in Biodiversity Research

For a long time, popular opinion has regarded molecular biology and ecology as being worlds apart for all practical purposes. The Frontiers in Biodiversity Research centre of excellence (FIBIR) is about to defeat the misconception – a large part of the centre’s work focuses specifically on the application of modern molecular methods in researching the diversity of the living environment. The six research groups of the centre are working to shed light on questions such as how do evolutionary history and human impact influence the biological diversity of ecosystems or why are ecosystems in a relatively small area such as Estonia still characterised by considerable differences. The answers to these questions will provide recommendations for efficient nature management and protection.

http://fibir.ut.ee/

The university’s research and development activities also focus on ensuring the continuation of Estonia’s national culture and independence, on supporting the development of the Estonian society, on improving public health, on innovation, on promoting research-intensive business ventures and on raising public awareness of scientific research and its results.

As Estonia’s national university, UT strives to preserve and develop the Estonian language and culture, offering the best research possibilities in the field of Estonian and other Finno-Ugric languages.

In addition to furthering fundamental research and research-based teaching, the aim of the University of Tartu is to turn intellectual capital into innovative technologies and products and to apply it in knowledge-intensive development work.

Myoton helps to give athletes the winning edge

Do you know what is Myoton? For example, Gerd Kanter, the world champion and olympic champion in discus throw uses this diagnostics device to measure the function of skeletal muscles.

According to the inventor of the Myoton, UT Senior Lecturer Emeritus Arved Vain, the device is widely used by researchers, sports medicine specialists and physical medicine and rehabilitation practitioners across the world. In 2008, end user training was offered to Myoton users in Estonia, Latvia, Lithuania, Russia, Finland, Switzerland, France, Italy, China, Taiwan and the United States. The development of a new method and a new design for the device started in October 2008, and will soon reach a test stage.

The centres of excellence in which UT participates as a partner are:

Centre of Excellence in Computer Science
http://cs.ioc.ee/excs/

Centre of Excellence in Genomics
http://genomics.ebc.ee/

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Mobile positioning helps design new roads

Rein Ahas, Professor of Human Geography at the University of Tartu, leads a research team that specialises in mobile positioning based space-time behaviour analysis. This is a method that uses mobile telephones for measuring geographical movement of individuals and human flows in cities.

Mobile positioning means the determining of geographical coordinates of the location of a mobile phone by radio waves. Location information can be used for modeling traffic flows, for studying tourism geography or for urban planning applications. For instance, positioning analysis was used for reconstruction projects of the Tallinn-Tartu highway and for developing tourism marketing strategies for Southern Estonia. The Bank of Estonia employs mobile positioning based tourism models for macroeconomic analysis.

The methodology will be elaborated and the analysis will be carried out by researchers from the University of Tartu in cooperation with the spin-off firm Positium LBS.

Robot mannequin brings custom-made clothes to online stores

Soon, you won’t have to worry about scouring tens of clothes shops to find the fitting garment. In cooperation with the University of Tartu and the Tallinn University, the company Massi Miliano OÜ has created a robot dummy that will make it cheaper and easier for tailors and dress-makers to make custom clothes. Forget about those endless fittings, or wasted shopping time – your figure will be digitised in a single measurement session, and you can then see the desired garment, be it a shirt, a suit or even a wedding gown, as it sits on a robot dummy that matches your figure to perfection.

The robot dummy project started in 2006, when Massi Miliano OÜ commissioned professor Alvo Aabloo of the UT Institute of Technology and Professor Maarja Kruusmaa of the Centre for Biorobotics of the Tallinn University of Technology to create a prototype. In addition to Massi Miliano, the project has later also been funded by the Estonian Development Fund, a number of private investors and the Eurostars programme, a joint R&D support venture established by private investors and 30 European governments.

In terms of novelty, the robot dummy project can be compared to Skype’s Internet telephony – experts think that the solution proposed by Estonian researchers may become key to raising efficiencies and promoting growth in the online sales of clothes.
Enrich your meal with beneficial Lactobacilli from the local supermarket

In a comparative study of intestinal microflora in Estonian and Swedish children, researchers found that children with a higher concentration of lactobacilli in their intestines were less likely to have allergies. The study spurred scientists to compare various lactobacillus strains found in humans and to investigate these bacteria for a combination of properties likely to be the most beneficial for us.

The investigations conducted by UT microbiologists and biochemists showed a novel strain of Lactobacillus fermentum ME-3 to possess remarkable antimicrobial and antioxidative properties, making it suitable for use in probiotic products for application against oxidative stress injuries. Applied research has resulted in the creation of the Hellus (“Tenderness”) series of dairy products containing ME-3 bacteria, available in Estonian supermarkets. New probiotic products based on the lactobacilli collection of UT researchers are already in the pipeline.

One of the discoverers of the Lactobacillus fermentum ME-3 bacterium, UT Professor Marika Mikelsaar, was crowned the winner of the 2008 Korea International Women’s Invention Exposition in Seoul.

UT scientists help curb heat loss of buildings

Worried about chilly autumn winds finding their way into your living room, and about skyrocketing heating bills? A saving solution may just be on offer – you should consider resorting to energy-efficient building technology. Tõnu Mauring, Head of the Core Laboratory of Energy Efficient Construction of the University of Tartu, has devoted a dozen years to promoting sustainable living and the use of natural construction materials to help people reduce their energy consumption. For example, his work is informing our choice of construction materials and designs to be used in order to build energy efficient homes with optimal thermal protection.

In the current economic climate, it is of crucial importance to reduce the resource consumption rate of buildings constructed today for constant use. This applies equally to private homes, blocks of flats, office buildings and large public buildings. According to Tõnu Mauring, plenty of opportunities for reducing resource consumption remain to date untapped because of our inadequate knowledge. Although energy conservation and eco-construction are steadily gaining ground in Estonia, scientists can help the country speed up progress in this area.

Scientists hoping to trick HIV

Mart Ustav, Professor of Biomedical Technologies, has been working with his colleagues on developing an HIV vaccine since 1999. The researchers in Tartu work as part of the research team of the Finnish biotechnology company FIT Biotech. According to Mart Ustav, the working conditions are excellent and their team is a prime example of scientists working to find solutions to problems that are crucial for the society.

“Our goal is to develop a vaccine that works and to demonstrate its ability to offer real protection against the viral infection,” says Mart Ustav. “Although it is uncertain whether such an HIV vaccine is at all possible—that is, whether the laws of nature allow it—we can learn this only through experiment. We must find a way to trick the virus.”

An analysis of building layout may help you reduce your heating bills
Ancient agricultural fields link Estonia to North Europe

The long-time work of UT archeologists in North Estonia has led to a breakthrough – their discoveries at the site of Saha-Loo suggest that plough-based agriculture arrived in Estonia a thousand years earlier than it was thought previously. Stationary cultivation systems marked by stone or earthen borders were already established on the alvar soils of coastal Estonia in the late Bronze Age, i.e. 3000 years ago. In countries east of the Baltic Sea, no discoveries of agricultural fields dating from that period have been reported.

Investigations of the Saha-Loo site suggest that parcelled field systems emerged in Estonia at the same time that they did in North and North-West Europe. According to Valter Lang, UT Professor of Archaeology, the fact that similar field systems have been found in Great Britain, North Germany, the Netherlands and South Scandinavia are a sign of shared processes in the development of agriculture and society in those regions. “The study of ancient field systems has thus brought us to certain conclusions regarding the development of ownership of arable land in prehistoric times,” says Lang.

New IT solutions created in cooperation with IT businesses

Estonian top IT companies and industrial partners such as Webmedia, Skype Technologies and Swedbank, as well as a number of academic partners are involved in the Software Technology & Applications Competence Centre (STACC), initiated by the Institute of Computer Science in the University of Tartu.

The main objective is to promote sustained growth of the businesses depending on efficient use of advanced IT solutions. The two main development areas for STACC are data integration and mining (coordinated by Professor Jaak Vilo) and software and services engineering (coordinated by Professor Marlon Dumas).

Vilo and Dumas both have stated that the centre should be acting as a technology watch unit and a think-tank for the Estonian software industry. This involves applying the results of scientific research to develop innovative software products and services, as well as disseminating knowledge in emerging software technology trends and applications. “It’s important to bring major software technology developers and users to make joint investments in developing technologies for future growth areas”, stress the initiators of STACC.

Mart Ustav expects to make an effective HIV vaccine

Vaccine testing has moved from the test tube and animal studies to human subjects. A series of clinical trials, which were recently completed in the Republic of South Africa, demonstrated that the vaccine does have a biological effect on the HIV, i.e. as a result of vaccination, the quantity of HIV in the blood of infected persons decreased and the condition of their immune system improved. These results provide assurance that further research is worth pursuing.
The University of Tartu is expanding its provision of English-language education valued in the international job market. More than 600 international students come to UT to pursue various programmes from Bachelor’s to doctoral level. The list of programmes is diverse: from Cyber Security to Wellness and Spa Service Design and Management. Of Master’s programmes, the most popular are those of Semiotics and, in cooperation with the Tallinn University of Technology, Security and Mobile Computing. Semester modules and single courses are available in the fields of Baltic Studies, EU-Russian Studies, Semiotics, Software Engineering, Estonian and Russian as Foreign Languages, Applied Measurement Science, Actuarial Mathematics, Cryptography, and more. UT’s International summer university project offers a wide spectrum of programmes and modules in Social and Political Sciences, International Law, Tourism, Cultural Heritage, as well as Estonian or Russian as a foreign language.

For information about opportunities for studying at the University of Tartu, go to [www.ut.ee/studies](http://www.ut.ee/studies)
Hall of Fame

Friedrich Georg Wilhelm von Struve (1793–1864) (Astronomy) was Professor of Astronomy and Head of the university’s observatory. He was the first astronomer to calculate the distance from the Earth to a star and the initiator of the famous Struve Geodetic Arc, included in UNESCO’s World Heritage List.

Friedrich Wilhelm Ostwald (1853–1932) (Chemistry) won the Nobel Prize in Chemistry in 1909, and is known as one of the founders of physical chemistry. He studied at UT and defended his Master’s and Doctoral theses here.

Nikolay Pirogov (1810–1881) (Anatomy) – UT Professor of Surgery, founder of field surgery and topographic anatomy. Pirogov was among the first to use ether as an anaesthetic, devised the plaster cast and improved many other field surgery procedures.

Karl Ernst von Baer (1792–1876) (Embryology) is the founder of embryology and the discoverer of the mammalian ovum. He graduated from UT and went on to become a university professor in Königsberg.

Yuri Lotman (1922–1993) (Semiotics) is the founder of the world-famous Tartu-Moscow School of Semiotics, widely known for its Sign Systems Studies series, the world’s oldest periodical publication on semiotics. Lotman’s printed works are widely cited, their number exceeds 800 titles.

Paul Ariste (1905–1990) (Finno-Ugristics) laid the foundations of modern Estonian Finno-Ugristics. He trained many linguists from Finno-Ugric nations living in the territory of the Soviet Union, and published 1300 research titles.
Basic facts:

Approximate number of students – 16,000,
   including:
   appr. 630 international students
   appr. 1200 doctoral students

Approximate number of academic staff – 1700,
   including 180 professors

9 faculties
5 colleges
Founded in 1632