

ECIU Member Research Profile



University of Twente Enschede - The Netherlands

The University of Twente (UT), celebrating its 45th anniversary in 2006, offers a unique combination of technology, health care, societal and behavioural disciplines, both in research and education.

Originally founded as the third 'Technische Hogeschool' in The Netherlands, situated in a region that had to make the transition from a past of textile industry towards a knowledge intensive future, the aim from the beginning was to offer more than technical disciplines. Additionally, the philosophy of bringing more disciplines together is that they strengthen each other. The introduction of nanotechnology as one of the main research areas, for example, also means considering societal or even ethical aspects, thus leading to strategies for reaching public understanding and acceptance. Designing new products or machines also means thinking about ergonomics, user interfacing and environmental issues. An open attitude towards society is the result, as well as close cooperation with companies, governmental organisations, hospitals and other healthcare institutions.



Excellence in research

Academic excellence is one of the University's important ambitions; generating spin-off activities and adequate knowledge transfer is another. In terms of the number of spin-off companies, 600 in about 20 years, UT outclasses all other universities in The Netherlands. In terms of scientific excellence, the University ranks sixth in the European Commission's 2003 Science and Technology Indicators.

Focus areas

Although the spread of disciplines at the University is wide, sharp choices have been made in research within six focus areas closely related to the teaching programmes. The University of Twente concentrates its research within six institutes, each covering one of these focus areas.



Further information about research at Twente

For general information about research at the University of Twente, contact Mr Wiebe van der Veen in the University's Communication Office.

Email w.r.vanderveen@utwente.nl

Phone +31534894244.

Next research profile

If you would like to profile your university's research in an ECIU newsletter, please contact Fiona Campbell (fiona.m.campbell@strath.ac.uk) or Saskia Hansen (saskia.hansen@strath.ac.uk) at the University of Strathclyde/ECIU Secretariat.

Nanotechnology and Microsystems

MESA+ Institute for Nanotechnology

The largest research institute of the UT, MESA+ has over 450 people working on structures the size of individual molecules and atoms. Nanotechnology will offer numerous new properties to materials and devices and 'boost' miniaturisation. MESA+ combines knowledge of electrical engineering, chemistry, applied physics and mathematics to reach a truly multi-disciplinary approach to nanotechnology.

The Institute has acquired a renowned position in the world and is the driving force behind the Dutch national nanotech programme. Over 30 companies have



been founded around the Institute, developing for example lab-on-a-chip systems for medical applications, microelectronics and devices for optical telecommunication. MESA+ offers vast clean room facilities and is currently building the new NanoLab on the campus.

Strategic research orientations within the Institute:

- BioNanotechnology
- MesoFluidics
- NanoElectronics
- NanoFabrication
- Bio Multi Analyte Diagnostics
- Molecular Photonics
- Response of Living Cells to Mechanical Stress

Further information: www.mesaplus.utwente.nl

Within microchannels of a lab-on-a-chip, living cells flow and can be stopped at a 'side channel' for a short period of time. There, medication or chemicals can be added to the cell by a process called electroporation. The cells move on and are still fully viable afterwards.

Information and Communication Technology (ICT)

Centre for Telematics and Information Technology (CTIT)

Both in teaching and research, the University of Twente has a strong position in ICT. The University offers a wide number of ICT-related bachelor and master programmes and is always at the forefront of applying ICT in innovative ways to teaching and education. UT has enrolled full wireless internet access on the entire 346-acre campus. On the research side, CTIT is the largest ICT research institute in The Netherlands. CTIT links application areas in society, like healthcare, to a sound background in computer science and offers many interdisciplinary cross-connections.

Research topics within CTIT include 'smart surroundings': the development of systems for ambient intelligence; telemedicine and telemonitoring applications; applications in traffic and logistics and security issues. CTIT is an attractive partner for industry and other research institutes, and is actively stimulating spin-off companies.

Research orientations within the Institute:

- A-Services Internet
- Integrated Security and Privacy in a Networked World
- Building Blocks for Ubiquitous Computing and Communication

- Natural Interaction in Computer-mediated Environments
- ICT in Healthcare
- e-Productivity

Further information: www.ctit.utwente.nl



ICT in health care, using wireless techniques like GPRS or UMTS, enables distance monitoring of patients, thus supporting their self-confidence and avoiding unnecessary use of hospital beds.

Biomedical Technology

BMTI Institute for Biomedical Technology

Finding ways to improve quality of life using technological solutions: that is the main ambition of the BMTI Institute for Biomedical Technology. Restoring lost body functions, using techniques for rehabilitation and artificial stimulation of nerves and muscles, has always been a strong field of research in which the Institute has built up close cooperation with the medical sector. Non-invasive diagnostics, using innovative technologies like photoacoustics, is another theme.

A major new development within the Institute leads to *regenerative medicine*: use a patient's own cells to grow tissue and repair damage without having to use bulky and non-biocompatible artificial solutions. Tissue engineering of skin and cartilage is already clinical practice,

and progress has been made in more complex tissue like muscle and bone. Business emerging from the research is stimulated by the successful 'business accelerator for tissue engineering and technical life sciences'.

Research orientations within the Institute:

- Biomimetic Engineering/Regenerative Medicine
- Biomechanics and Rehabilitation Technology
- Non-invasive Diagnostics

Further information: www.bmti.utwente.nl

Mechanics, process technology and mechatronics

Institute for Mechanics, Processes and Control Twente (IMPACT)



IMPACT has chosen two main orientations for its research: *sustainable energy* and *smart devices and materials*. For supporting both themes, the Institute can rely on research groups from electrical engineering, applied physics, chemistry, mechanical engineering, civil engineering and applied mathematics, around the areas of:

- Fluid and solid mechanics
- Thermal conversion and thermal engineering
- Chemical engineering and process technology
- Materials engineering and synthesis
- Design, production and control
- Computational Science and Engineering

Research within IMPACT includes the mechanics of solids, fluids and soft materials, process technology, microsystems and mechatronics. In addition, a water engineering and management group is part of the Institute. IMPACT has strong connections with industry in The Netherlands and abroad. Sustainability is the key word.

Further information: www.impact.utwente.nl

Sustainable energy is one of IMPACT's research priorities. The institute can therefore rely on research groups focused on thermal conversion and biomass, as well as on membrane and catalyst technology.

Behavioural Sciences

Institute for Behavioural Research (IBR)

In order to improve communication, cognition, learning, knowledge transfer and labour environments, fundamental insight is needed into human behaviour. IBR develops theories and models for this, to be used in educational, corporate and healthcare settings. IBR demonstrates special interest in behavioural applications of ICT, through a focus on the development of educational software and multimedia applications. IBR evaluates and tests theories through laboratory and field experiments, large-scale surveys, and case-study research. The Institute seeks to accomplish its mission in cooperation with national and international governmental and private organisations.

IBR 's research programmes:

- Cognitive tools for problem-based learning environments
- Communication and Social Influence
- Computerised testing of knowledge and skills
- Effectiveness of school and training organisations
- Curriculum design and implementation
- Design, implementation and use of communication means

Further information: www.ibr.utwente.nl



The electronic learning environment TeleTOP, developed by the University of Twente, was first introduced in all study programmes at the University. It now finds its way to secondary schools, as well as to multinationals using it for worldwide in-company training.

Governance Studies

Institute for Governance Studies

IGS supports research in the fields of management, governance, and innovation studies. How do governments, companies and individual citizens face current and future organisational changes? In all this, issues of co-ordination, steering and the operation of institutions in both public and private sectors are core research foci, based on a multi-level, multi-actor perspective. IGS strives to combine scientific excellence with relevance for stakeholders in the public and private sector.

The research programmes of IGS are:

- Sustainable innovation
- Higher education and research in the knowledge society
- Innovation in construction processes
- Innovation in water management
- Innovation of governance
- Innovation at national, sector and organisational level

Further information: www.igs.utwente.nl



IGS' Professor Jacques Thomassen is a renowned expert in political science. He was appointed University Professor by the UT in 2005.