DTU Compute – Department of Mathematics and Computer Science

Shaping the Digital Future

From the people. To the people. For the people.

At DTU Compute, technology and people work hand in hand to create a better future. This is not just a vision but our daily reality. We are dedicated to shaping the digital future with people at the centre.

Our mission is to drive the development and use of technology to benefit both society and individuals.

Digitalization is revolutionising our lives and work, weaving technology into every aspect of our daily lives. From smart homes and cities to cutting-edge healthcare technologies and automated work processes, this transformation brings both exciting opportunities and new challenges.

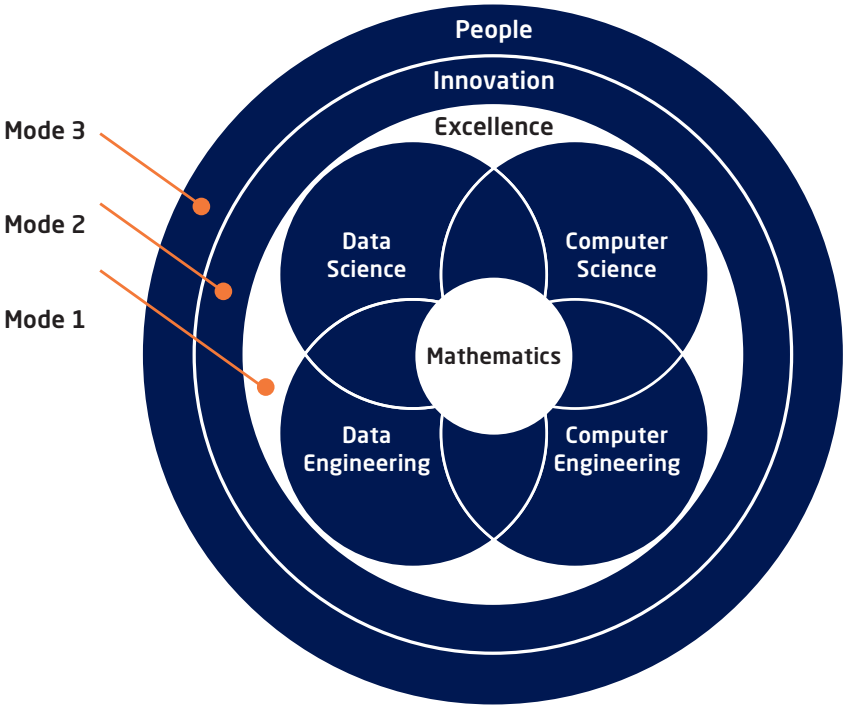
At DTU Compute, we take responsibility for this digital transformation and focus on vital digital agendas for Europe: Artificial Intelligence (AI), Chip design, and Cybersecurity. Our research provides crucial insights in a world marked by geopolitical tensions, where digital resilience becomes increasingly essential.

We foresee a future where digital technologies not only enhance technical solutions but also drive sustainable innovation and strengthen democratic values. DTU Compute is at the forefront of human-centred digital technology: we want technology with a human face.

With over 400 employees, DTU Compute is Denmark's largest environment for mathematics and computer science, hosting some of the world's leading researchers in artificial intelligence. Simultaneously, we educate our students to develop a strong digital mindset.

"DTU Compute's research provides crucial insights in a world marked by geopolitical tensions, where digital resilience becomes increasingly essential."

– Jan Madsen, Head of Department



DTU Compute's vision to take leadership can be described in these three modes

Mode 1: We strive to strengthen our legacy of excellence in research and education.

Mode 2: We aim to apply our research results and insights to advance relevant industries and to create a better society for the future.

Mode 3: We want to help prepare our society to understand, embrace, and utilize the digital transformation for the benefit of society.

Technical University of Denmark

Research

Our core research areas - mathematics, data science and engineering, and computer science and engineering – are the foundation of all our research activities and educational programmes. These core areas are thematically expanded within AI, Chip design, and Cybersecurity:

- **AI:** We are a leader in the application of artificial intelligence (AI) and work across multiple research areas to harness the potential of this technology. The institute focuses on developing AI solutions that can be utilized in both industry and the public sector. We are part of various partnerships, including DIREC - Digital Research Centre Denmark and the Pioneer Centre for Artificial Intelligence, to strengthen the use and development of AI.
- **Chip design:** We have a long tradition of working with chip design and continue to play a central role in the development of technology in Denmark. DTU Compute focuses on developing chips that can accelerate artificial intelligence (AI) with low power consumption. DTU Compute is also actively involved in education within chip design.
- **Cybersecurity:** The entirety of digitalization hinges on the security of both data and computing systems we rely on every day. Cybersecurity plays a key role in ensuring that both data and systems are secure, resilient, and trustworthy. We focus on the methods, processes, and tools for designing, developing, and analysing secure computing systems. We serve as a prime partner for research on cybersecurity and cryptography, collaborating closely with Danish Defence.

Building on top of them, we work within cross-disciplinary domains, such as:

- **Life Science:** Digital solutions are essential for developing our future healthcare, especially AI, and high-quality data curation, software implementations, and use of supercomputing for training AI are central components. We are part of the Technical University Hospital of Greater Copenhagen (TUH) and collaborate with industry. The research includes medical devices, cognitive processes, and social networks to detect well-being and to avoid biased datasets for AI models.
- **Green transition:** We develop computational tools for Smart Energy Systems. In the future weather-driven energy systems, decentralized solutions must ensure that consumption adapts to production (wind and solar) through flexibility and Power2X. AI is the key to solutions for flexible consumption.
- **Research infrastructure:** Analyzing the vast amounts of imaging data that come with digitalization and the increased access to large-scale facilities in Europe, such as MAX IV, requires special computational setups. At the QIM Center, we develop among other things algorithms for quantitative image analysis to support the research.

Innovation and Entrepreneurship

DTU Compute is deeply integrated into a strong entrepreneurial ecosystem that helps students and staff turn research-based startup ideas into reality. We focus on entrepreneurship and innovation and support national and EU digital strategies such as the EU AI Act and Chip Act.

Social and Ethical Responsible Digital Transformation

DTU Compute is providing unique insights into the digital transformation and how it impacts society, organisations, and individuals. We participate in public working groups both nationally and internationally. Within Tech4Civ, we research and co-create methods and tools to empower people to participate in democratising the digital transformation, based on a strong ethical, human, and sustainable mindset.

Education

We educate students from bachelor's to PhD level and offer continuing education, open lectures, summer schools, and courses. Our teaching focuses on AI, digitalization, and cybersecurity, based on our core research areas. Approximately 20 per cent of the students at DTU are enrolled in programmes led by DTU Compute. Each year, we have approximately 25,000 students participating in our roughly 200 courses.

Diversity and Inclusion

At DTU Compute, we prioritise a diverse, inclusive, and welcoming atmosphere. We see diversity as a force that fosters creativity and innovation. To further this commitment, we have established a Diversity Living Lab, which focuses on supporting female researchers and researchers with international backgrounds. This initiative is funded by, among others, the VILLUM Foundation and the Novo Nordisk Foundation. 45 per cent of our employees have a background other than Danish.

If you want to know more or team up with us, just get in touch.
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