Department strategy

Department of Electrical Engineering, IT and Cybernetics (EIK)

Faculty of Technology, Natural Sciences and Maritime Sciences (TNM)

Key information

The Department of Electrical Engineering, IT and Cybernetics (EIK) is located at the Porsgrunn campus in an international environment surrounded by a various business community and industry.

We offer studies at all levels within automation, electric power engineering, digitalization, welfare technology, renewable energy, as well as autonomy and sustainability in the process industry.

The institute has extensive research activity and collaborates closely with regional and international partners. Our research groups are leaders in several technology areas, as well as entrepreneurship and student businesses.

293
Students (2022)

5
Study programs Ba
and Ma programs

17
PhD students

58
Employees

Lifelong learning

2019/20:
- Digital twins for the process industry 2019, 12 participants
- Smart Data from Big Data for the Process Industry 2020 (requirement of 10). Offered in 2020, but not run due to too few applicants.
2022/23:
4 courses funded by Norwegian Directorate for Higher Education and Skills.
 have been developed. Two courses developed from NTNU and two courses from USN.
Courses at NTNU:
1) Technology management. Autumn 2022. 19 participants.
2) Cyber Security. Spring 2023. 18 participants.

Courses at USN:
1) Multivariate Data Analysis. Autumn 2022. 14 participants.
2) Digitization for the Process Industry. Spring 2023.
Credit-bearing EVU courses on Python programming every semester since autumn-2019. Financially supported by Vestfold and Telemark County Council and Norwegian Directorate for Higher Education and Skills.

Planned new courses:
· "Digitalization and sustainability" together with USN/HH and UiA.
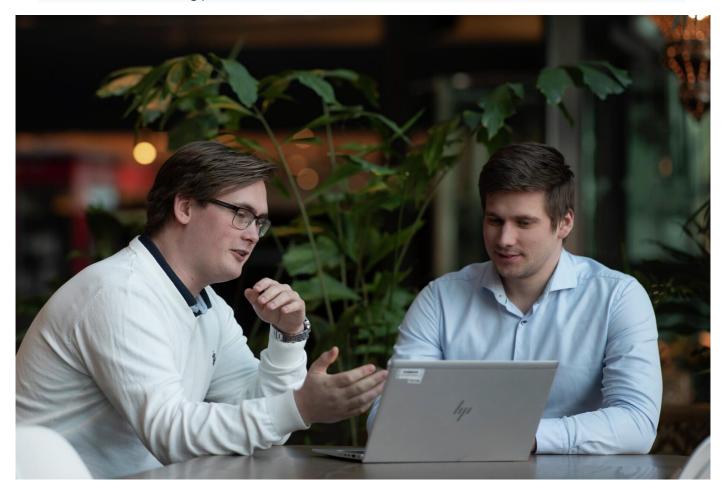· Electrical Power Engineering: "Flexible energy markets and cyber security" in 2024/25.

Priority research areas

Sustainable energy transformation
· Modelling of energy systems
· Electricity markets
· Hybrid energy systems
· Electrification
· Power electronics and motor drives
· Digitization
· Process optimization

· Predictive maintenance
· Welfare technology
· Power production and distribution
· Autonomy
· Student-active learning processes

Research groups

AMOC – Applied Modeling and Control
· Sensor technology
· Instrumentation
· Data collection
· Data analysis
· Mechanistic and "data-driven" modeling of dynamic systems
· Machine learning
· "Internet of things"
· Industrial IT
· Automation
· Simulation
· Prediction
· Software engineering and programming
· MPC
· Welfare technology
· Electrification and digitalization
· Energy production (water, wind and biogas)
· Autonomy
· Optimization

EPS – Electrical Power Systems
· System Optimization, Digitalization, and Integration (Hydro, solar, wind, and storage)
· Power Delivery and apparatus
· Multi-energy markets (Flexible, ancillary services, and economics)
· Electrification (transport, land-based process industry, offshore)

ESE – Entrepreneurship and Student Enterprise
· Innovation and entrepreneurship
· Student companies
· Team composition and success
· The students' various motivational triggers

Research and innovation center

Center for sustainable process industry
(not approved yet)
In collaboration with the Department for Process, Energy and Environmental Technology (PEM).
· Hydrogen
· Industrial circular economy
· Digitization
· Electrification

· CO$_2$ capture
· Processing of bioresources

External funding:
Total turnover for EIK in 2022 is NOK 8.9 million. The largest share of the turnover comes from the Research Council of Norway: NOK 5.2 million. Other funding sources are "Other contributions" NOK 2.5 million, EVU NOK 1.1 million and commissioned projects NOK 58 k.

Department strengths and strategic advantages

· Good cooperation with other institutes, e.g., PEM
· Very good working- and research environment
· Good lab facilities
· Good cooperation with regional working life
· Attractive fields of study at all levels

Vision, values and community assignment

Regionally rooted

and internationally recognized.

Close to communities and working life, where people live and work

Sustainable

Innovative

The key to good social development is wise and knowledgeable citizens. USN will develop and disseminate new, boundary-breaking knowledge and offer education of high international quality.

The university's main profile is profession-oriented, working life-oriented and socially relevant educations. Both research and education are characterized by close interaction with social and working life in the region. Our eight campuses are a unique strength. With this presence, the university will make higher education and research more accessible. We shall be an active driving force for knowledge-based development in partnership with society and working life.

The university will focus on societal challenges and contribute to solving them through an interaction of applied research, basic research, education, artistic development work, communication, and innovation. Challenges related to climate, energy.

The department's long-term ambition/desired future image

EIK offers future-oriented studies and research that contribute to a sustainable energy transformation and increased data security.

The department is visible and the preferred regional partner within our fields of expertise. We have strengthened academic collaboration with several European universities and increased interdisciplinary collaboration with other institutes and research centers. We have created an active campus environment and recruit more from a greater diversity of students, both nationally and internationally.

The department's values relate to USN's values

The department's values	
Close to social and working life	We are a connecting industry, research and education, and help society to develop and make use of new ideas.
Sustainable	Our research and education develop knowledge, expertise and perspectives that contribute to a better future through the UN's sustainability goals.
Innovative	We develop engineering and technology education at all levels in close collaboration with national industry.
Reflected	We promote and protect academic freedom.
Conveying	We are active communicators of knowledge and contribute to diversity, equality, and mutual understanding in society.

USN's overall goals

Ministry of education and research's sector goals

High quality in education and research

Sustainable social development, welfare, and innovation

Good access to education and skills throughout the country

Goals in the development agreement between KD and

To be an open University that offers work-life-integrated and flexible education.

To be a future-oriented university that contributes to a knowledge-based critically reflected and sustainable social development in collaboration with society and working life.

To be an innovative multi-campus university that collaborates with community and working life in the region.

USN's institutional

1. Research-based and work-life-integrated educations of high international quality that promote critical reflection and strengthen innovative skills.

2. Several outstanding and internationally competitive professional environments, and research at a high international level.

3. Student-active learning processes and digital competence in all educations.

4. Flexible courses for lifelong learning.

5. New knowledge, insight and solutions with relevance for social and working life in the short and long term.

6. Partnership with community and working life and become a role model for such cooperation.

7. Competence and knowledge for green transition and sustainable economic, social, and cultural innovation.

Deparment goals:

Goal 1	Establish R&D and educational collaboration with 3 European universities by 01.01.2025	Based on business objective no: 1 and 2

Goal 2	Revitalize, renew, and provide more resources to the project model by offering students 1 project per semester.	Based on business objective no: 1, 3, 5 and 7

Goal 3	Establish a computer engineering program at bachelor's level by Aug. 1,2024.	Based on business objective no: 3 and 5

Goal 4	Create an active campus environment by inviting monthly meetings with the line association.	Based on business objective no: 7

Goal 5	Further develop the psychosocial environment by adopting the existing routine for onboarding and assigning a colleague the responsibility for the follow-up of the individual new employee.	Based on business objective no: 7

Goal 6	Create attractive study programs with a target of at least 20 % female students by 2026.	Based on business objective no: 7

Goal 7	Increase cooperation with companies and upper secondary schools.	Based on business objective no: 4 and 6

Goal 8	Make the 1st year in the engineering role more relevant by providing customized project tasks with concrete sustainability themes for each field of study.	Based on business objective no: 3, 5, 6 and 7

Selected areas of effort

Regional cooperation
An important initiative for regional cooperation is the establishment of a center for sustainable process industry. The study programs become more attractive through increased marketing, as well

as a more relevant and flexible study and course portfolio. External partners are increasingly invited into research and teaching.

Internationalization

We are increasing the exchange of students and academic staff to several European universities that cover our research fields and study areas. This requires mapping relevant partner universities, revitalizing existing partnership agreements and formalizing new agreements.

Interdisciplinary ventures

Our ambition is to strengthen cooperation with PEM and other institutes, business, and industry. In addition, we aim to develop several interdisciplinary subjects and projects with joint guidance from various professional environments.