



A PEEK AT OUR  
OVERARCHING VISION

NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

# KNOWLEDGE FOR A BETTER WORLD

TRONDHEIM | GJØVIK | ÅLESUND



NTNU



Norwegian University of  
Science and Technology

## **NTNU – Norwegian University of Science and Technology**

At NTNU, the Norwegian University of Science and Technology, we create knowledge for a better world and solutions that can change everyday life. From 2016, NTNU, the University College in Gjøvik, the University College in Sør-Trøndelag and the University College in Ålesund are merged to become one university. This gives us a more comprehensive range of study programmes and larger research communities. Together, we are Norway's largest, most exciting and most innovative university.

**[www.ntnu.edu](http://www.ntnu.edu)**

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**Gemini.no/en** is the webzine for research news from NTNU and SINTEF, Scandinavia's largest independent research group. News briefs and articles are published here daily.

**NTNU Alumni** offers meeting places for sharing knowledge and exchanging experience between NTNU and the working world. [www.ntnu.no/alumni](http://www.ntnu.no/alumni)

**NTNU Bridge** links students and employers for internships, thesis topics and projects. [www.ntnu.no/bridge/en](http://www.ntnu.no/bridge/en)

**NTNU VIDERE** – NTNU's Centre for Continuing and Professional Development offers further education of top quality. [www.ntnu.no/videre](http://www.ntnu.no/videre)



## TRONDHEIM

## GJØVIK

## ÅLESUND



### CONTENTS ● ● ●



Welcome	4
Map	5
The NTNU cities	6

Education	8
Research	12
Innovation	18



# WELCOME

Photo: Thor, Nielsen/NTNU Communication Division



## WELCOME TO NTNU!

In 2016, NTNU, the University College in Gjøvik, the University College in Sør-Trøndelag and the University College in Ålesund merged to become one university. We're now Norway's most innovative and exciting university – with 39 000 students and 7 900 employees.

As a multi-campus university, we make our mark in the three cities and in the regions where we are located.

NTNU's main profile is in science and technology, with great academic breadth that includes the humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities.

We will take advantage of our academic breadth and interdisciplinary skills to contribute to sustainable social development. Our resources will help to solve complex issues and improve understanding of the links between technology, society and the environment.

**In line with our vision: “Knowledge for a better world”.**

Gunnar Bovim, Rector NTNU

 [www.twitter.com/gunnarbovim](https://www.twitter.com/gunnarbovim)

NTNU operates in three cities. Today, the campuses in Trondheim have about 33 000 students and 7 200 employees. Gjøvik has almost 3 500 students and 390 employees, while Ålesund has over 2 300 students and 275 employees.

**TRONDHEIM**



**ÅLESUND**



**GJØVIK**



# THE NTNU CITIES

Trondheim – Gjøvik – Ålesund



Photo: Mentz Indergaard/NTNU Communication Division

## TRONDHEIM – Norway's best student city

Trondheim is well-known as a top location for students and academics. It has been ranked several times as Norway's best student city. The city has long traditions in education. The Trondheim Cathedral School has been in existence since 1152. The roots of today's university go all the way back to 1760, with the establishment of the Royal Norwegian Society of Sciences and Letters (DKNVS).

The Norwegian Institute of Technology (NTH) was founded in 1910. NTNU came into being in 1996, when NTH merged with the College of Arts and Sciences (AVH), the Museum of Natural History and Archaeology, the Faculty of Medicine, the Trondheim Academy of Fine Art and the Trondheim Conservatory of Music to become one university.

In 1994, Sør-Trøndelag University College was established, offering study programmes in health and social work, ICT, teaching and interpretation, technology, economics and management.

Trondheim has a population of more than 180 000, and 33 000 students who make their mark on the city. Studentersamfundet, the students' association, is the base for many of them. Every two years, volunteers from here organize UKA, Norway's largest cultural festival.

Students in Trondheim are also behind the International Student Festival in Trondheim, ISFIT – the largest of its kind in the world.

## GJØVIK

In a picturesque setting overlooking Lake Mjøsa, Gjøvik has strong traditions in education. The Gjøvik College of Engineering was established in 1966 and the College of Nursing in Oppland in 1970. In 1994, they merged to become Gjøvik University College.

Gjøvik is an international student city. The academic environments have wide-ranging collaboration with national and international communities and business. NTNU in Gjøvik offers programmes of study in computer and information science, media, technology, health, economics and management.

Photo: Anders Gimstvedt/Gale



## ÅLESUND

Close to the mountains and the sea, Ålesund has been honored as Norway's most beautiful city (The Times) with its Art Nouveau style. Ålesund has a long tradition as a trading centre; its business community is built on a strong entrepreneurial spirit and many innovative networks.

Aalesund University College was established in 1994 when the College of Engineering, Aalesund College of Nursing and the College of Marine Studies merged. Today, NTNU in Ålesund has expert academic environments and offers programmes of study in engineering, biology, health sciences, maritime disciplines, as well as subjects in economics, management and administration.

Photo: Tony Hall



International researchers and students make their mark on the NTNU cities. NTNU has more than 3000 students from all over the world.



## EDUCATION

Talented students. The skills of the future.



### GRADUATES FOR TOMORROW

NTNU's main profile is in science and technology, with great academic breadth that includes the humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities.

NTNU offers about 400 bachelor's, master's, professional, and doctoral programmes as well as a wealth of continuing and further education.

### NEW TEACHING TECHNIQUES

Simulation is a teaching method used in several programmes of study at NTNU. Simulation prepares students for scenarios they will encounter in their career.

Experts in Teamwork is a course at the master's level where students learn to work across different disciplines as a cohesive group. Students from the breadth of NTNU's programmes work to answer challenges drawn from society and the working world.

### CHOICES IN EDUCATION

The best students from secondary school choose NTNU. Studies show that NTNU students soon find relevant and rewarding jobs after they graduate.



## BUILDING THE NATION

NTNU is Norway's largest and leading provider of engineering graduates. Subject areas range from nanotechnology and IT to petroleum engineering and ship design. Partnerships with the working world and NTNU's own research communities equip students with up-to-date and relevant skills to take with them into the workplace. Most technology students have job offers before they graduate.

## BUILDING THE FUTURE

NTNU is one of Norway's two largest institutions for teacher education. We offer education for primary and lower secondary school teachers as well as five-year integrated master's programmes for teaching the natural sciences, social sciences, history, geography, language and sports. We also offer science specializations for primary and lower secondary school teachers. Teaching graduates from NTNU are in great demand on the job market.

Photo: Espen Dalmo



## PROFESSIONAL STUDY

NTNU offers programmes of professional study that provide students with relevant and career-related practical training in cooperation with the working world throughout the programme. NTNU is an attractive partner because our students represent high academic standards and new research-based knowledge.

## NTNU HAS NORWAY'S LARGEST VARIETY OF PROGRAMMES IN ARTISTIC AND AESTHETIC DISCIPLINES.

### MUSIC

NTNU has one of the world's best programmes of study in jazz and has cultivated many of Norway's music stars. The band Highasakite, which originated from NTNU, has topped hit lists around the world.

Photo: Oscar Skjellberg Johansen



### MUSIC

The Trondheim Soloists are among the world's foremost chamber ensembles. Several of the musicians are students or alumni from NTNU. The Trondheim Soloists tour the world, have six Grammy nominations, and trust NTNU to educate the soloists of tomorrow.

Photo: Torbjørn Tønde

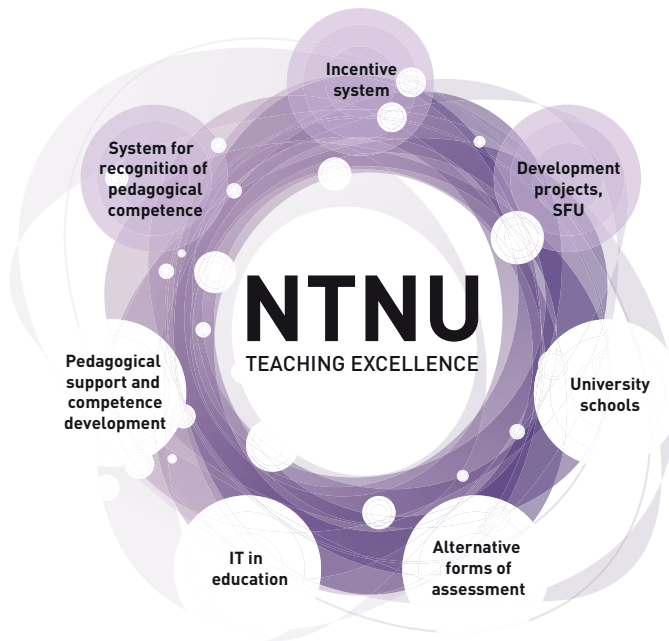


NTNU Professor Anne-Karin Furunes has exhibited at the Hong Kong International Art Fair and at several galleries in the USA.

Photo: Gorm Kallestad, Scanpix



### FINE ARTS



## EDUCATION QUALITY

NTNU's Live Studio project at the Faculty of Architecture and Fine Art received an award presented by the Ministry of Education and Research for quality of education in 2015.

Together with SINTEF, NTNU students designed and built a bold structure in timber. This is a cantilevered pier projecting 12 metres out over the Nidelva river.

## NTNU TEACHING EXCELLENCE

NTNU Teaching Excellence aims to help NTNU to achieve its goal of providing quality education at a high international level.

A variety of initiatives will collectively strengthen teaching skills by developing innovative teaching, learning and assessment practices. The aim of the measures is to improve students' learning outcomes.



Photo: Magnus Buseth

## NORWAY'S MOST ELECTRIFYING STUDENT PROJECT

NTNU students have developed the electric racing car "Vilje" ("Resolve"), which accelerates from 0 to 100 km/h in less than three seconds. The car was built by the student organization Revolve NTNU, a team with representatives from 13 different disciplines, including mechanical engineering, engineering cybernetics, energy and environmental engineering, as well as industrial economics and technology management.

Every year, the students participate in "Formula Student", the world's largest engineering competition for students. As well as becoming experts in their disciplines, the students gain unique experience in project and interdisciplinary work. This is theory in practice and an example of what innovative and enterprising students from NTNU can achieve when they work together.



# RESEARCH

Our research aims to provide  
"Knowledge for a Better World"



Photo: Geir Mogen/NTNU DMF

NTNU has research communities within its main profile in science and technology and in the humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities.

NTNU has a special responsibility to conduct interdisciplinary research and works in close partnership with the business community. Much of this research requires advanced technical equipment, and NTNU has more than a hundred research laboratories.

Examples:

- NTNU NanoLab
- The marine technology laboratories
- The European Carbon Dioxide Capture and Storage Laboratory Infrastructure (ECCSEL)
- NISlab – Norwegian Information Security Laboratory

## INTERNATIONAL COOPERATION



NTNU participates actively in the EU framework programmes for research, Horizon 2020.

NTNU works in partnership with research communities all over the world, including MIT, Stanford University, UC Berkeley, TU Delft, DTU, Tsinghua University, Shanghai Jiao Tong University, University of Tokyo and United Nations Interregional Crime and Justice Research Institute.



In 2014, NTNU professors May-Britt Moser and Edvard Moser were awarded the Nobel Prize in Physiology or Medicine for their discoveries of cells that make up an “inner GPS” in the brain.

## GRAPHENE

Researchers at NTNU have developed and patented a method to produce semi-conductors on a substrate of graphene, a carbon-based material. Graphene is inexpensive, transparent and flexible, and conducts electricity and heat efficiently. It could revolutionize the production of solar cells and LED components.

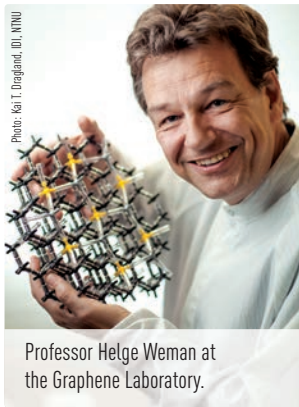


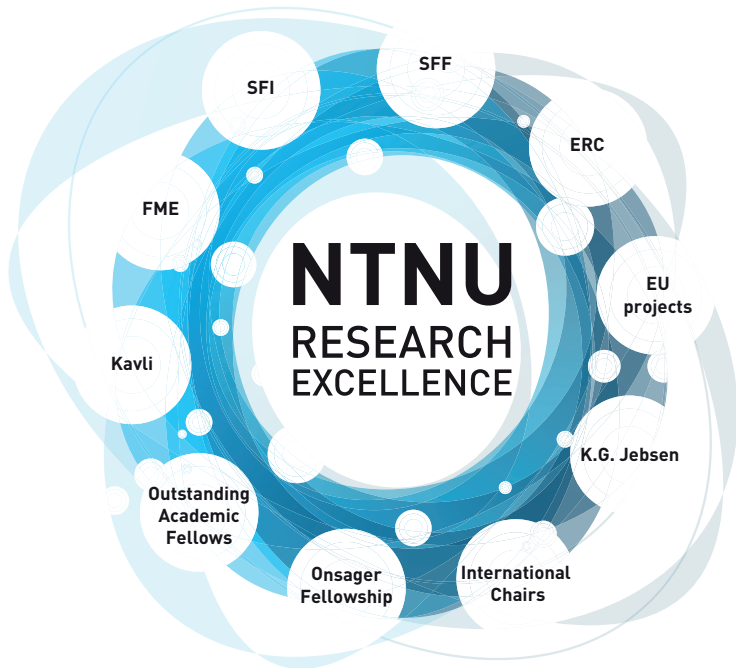
Photo: Kai T. Dragland, IDI, NTNU

Professor Helge Weman at the Graphene Laboratory.

## MATHEMATICS

Mathematics Professor Emerita Idun Reiten at NTNU is at the forefront in work on the representation theory of algebras. As one of the world's most cited researchers, she is on the list of Highly Cited Researchers, which includes only one per cent of researchers in each discipline.





## NTNU RESEARCH EXCELLENCE

NTNU hosts the Kavli Institute for Systems Neuroscience, four national centres of excellence and elite seven centres for research-based innovation, as well as a wide range of research schools.

We work in close partnership with SINTEF, one of Europe's largest independent research institutes. Together, NTNU and SINTEF are responsible for six national research centres for eco-friendly energy.

Researchers at NTNU have received several grants from the European Research Council (ERC).

## INTERNATIONALLY OUTSTANDING

NTNU aims to be internationally outstanding and to provide its researchers with the best conditions for their academic development and recognition of merit:

- Through the "Outstanding Academic Fellows Programme", NTNU aims to cultivate elite researchers.
- The aim of the Onsager Fellowship is to recruit talented young researchers with experience from universities abroad.
- Through collaboration with industry partners, NTNU recruits academics with international recognition in their field as International Chairs at NTNU.

Photo: Tony Hill



## CENTRE FOR RESEARCH-BASED INNOVATION IN MARINE OPERATIONS

NTNU in Ålesund develops knowledge, tools, technology and training for equipment installations in extreme waters. The centre leads the field in harnessing the oceans in marine and maritime industry.

## DOCTORAL EDUCATION

Doctoral education is one of NTNU's most important obligations to society. Every year, more than a quarter of Norway's doctorates are completed at NTNU.

More than 2000 candidates are studying for their doctoral degrees at any time. More than 40 per cent of those who defended their thesis in 2015 were international candidates. Especially in technological disciplines, we recruit many international PhD candidates.

The organized research training programme at NTNU emphasizes recruitment of the best candidates both nationally and internationally. A doctoral degree from NTNU must represent a high international level and lead to opportunities for a future career in academia, industry and public-sector organizations.

Almost everyone with a doctoral degree from NTNU finds a job quickly. At the same time, 95% of them say that their doctoral education is relevant to the job they have today.

Photo: Geir Mogen/NTNU Mandala



Nine of ten Norwegian doctorates in technology come from NTNU.

## NOBEL PRIZES



Four people with a background from NTNU and its predecessor NTH have won Nobel Prizes. They are May-Britt Moser and Edvard Moser (Physiology or Medicine, 2014), Ivar Giæver (Physics, 1973) and Lars Onsager (Chemistry, 1968).

Photo: Geir Mogen/NTNU, Nils Bjørnseth, VTHH-trykk, Osagerarkivet/IBT

## THE MOZART OF LINGUISTICS

Terje Lohndal, one of NTNU's Outstanding Academic Fellows, became Norway's youngest professor in 2013. He has been called the Mozart of linguistics. Just as chemists have found their periodic table, he searches for the elements and building blocks of language.



Photo: Terje Trahe, NTNU Communication Division

# STRATEGIC RESEARCH AREAS 2014–2023



Photo: John Andre Aasen/NTNU Communication Division

Through interdisciplinary cooperation, NTNU's strategic research areas address complex challenges of great importance for society.

Our aim is to meet global challenges with an interdisciplinary and flexible organization, to strengthen cooperation with the world of work and business as well as our innovative capability, and to increase our share of international research funding.





## **NTNU ENERGY**

– energy for a better society

- Metallurgy
- Energy storage
- Energy efficiency
- Carbon capture and storage
- Hydropower for the 21st century
- Advanced thermodynamic analysis
- Smart energy systems (smart grids)
- More efficient exploration and production of oil and gas
- Policy, innovation and social involvement for sustainable energy
- Technological solutions for renewable energy, especially solar energy, bioenergy and offshore wind power



## **NTNU HEALTH**

– innovative solutions to complex health challenges

- Diagnostics and treatment
- Health promotion, disease prevention and empowerment
- ICT systems, welfare technology and organization of health services



## **NTNU OCEANS**

– knowledge for a sustainable ocean

- The Arctic
- Sustainable seafood
- Green maritime transport
- The sea, the environment and society
- In the ocean depths
- Clean energy from the ocean



## **NTNU SUSTAINABILITY**

– knowledge for change

- Biodiversity and ecosystem services
- Sustainable urban and regional development
- Institutional framework
- Environment and sustainability analysis



Photo: Geir Mogen/NTNU/DMF

Together with GE Vingmed, NTNU developed Vscan, a pocket-sized ultrasound device. The medical imaging tool was one of TIME magazine's picks for the best inventions of the year. The device helps doctors make the correct diagnosis faster – and thus saves lives.

NTNU has taken responsibility for innovation for more than 100 years. Innovation includes entrepreneurship and commercialization. Our innovation processes grow from education, research and artistic activities. Working together with other players, NTNU paves the way for more start-ups and development in existing firms.

Students are our most important renewable resource. That's why student innovation is a high priority at NTNU.



## INNOVATION

More than a century of innovation

### INNOVATIVE EDUCATION ● ● ●

What if learning were a game? As a professor of gaming technology, Alf Inge Wang is appalled if he sees bored students staring at their desks. He is one of the people behind **Kahoot!**, a game that turns the classroom into a game show. The teacher measures students' knowledge while the teaching entertains them. With million of users around the world, Kahoot! has become a new global trend.



Photo: Kai T. Dragland/NTNU

## SOME OF NTNU'S INITIATIVES TO INSPIRE INNOVATION:

- Spark\* NTNU, where students with experience as entrepreneurs mentor students who want to develop their own ideas.
- The NTNU Entrepreneurship Center educates the entrepreneurs of tomorrow. Half of the center's students have started their own business by the time they graduate.
- NTNU Discovery funds projects in a very early phase. This has resulted in a variety of start-ups and commercialization projects.
- NTNU Technology Transfer (TTO) charts potential business ideas from NTNU. The most promising candidates receive help towards commercialization.
- The Intellectual Property Institute of Norway (IPIN) is a national knowledge centre for intellectual property rights.



## NUCLEAR PHYSICS ● ●

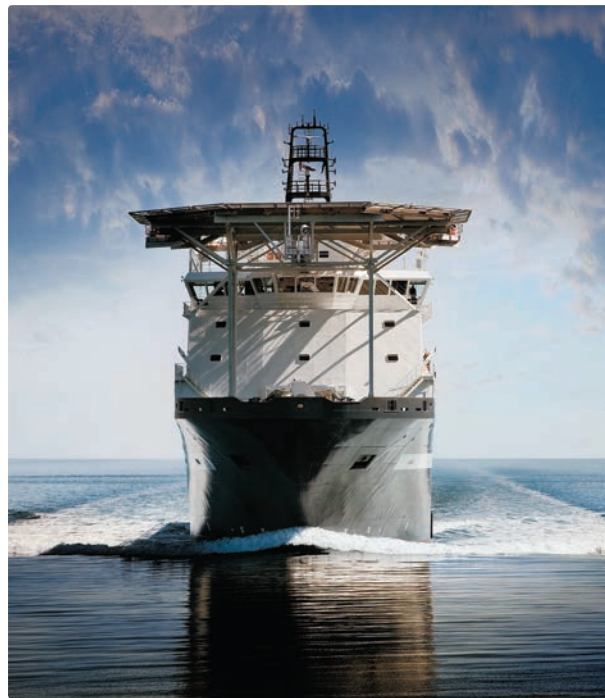
From 2014, NTNU has been a Business Incubation Centre for CERN technologies. This enables technology transfer from CERN, the European Organization for Nuclear Research, to NTNU for commercial development.



## INFORMATION SECURITY

NISlab, the information security group at NTNU in Gjøvik, conducts research on methods for authentication and verification of users.

Raghavendra Ramachandra is working on ways to improve face recognition to prevent forgery.



## MARITIME INNOVATION

NTNU in Ålesund works in close partnership with the maritime sector in areas including product development and innovation.

The maritime cluster in Norway's Møre region is in the global forefront in maritime technology and operations.