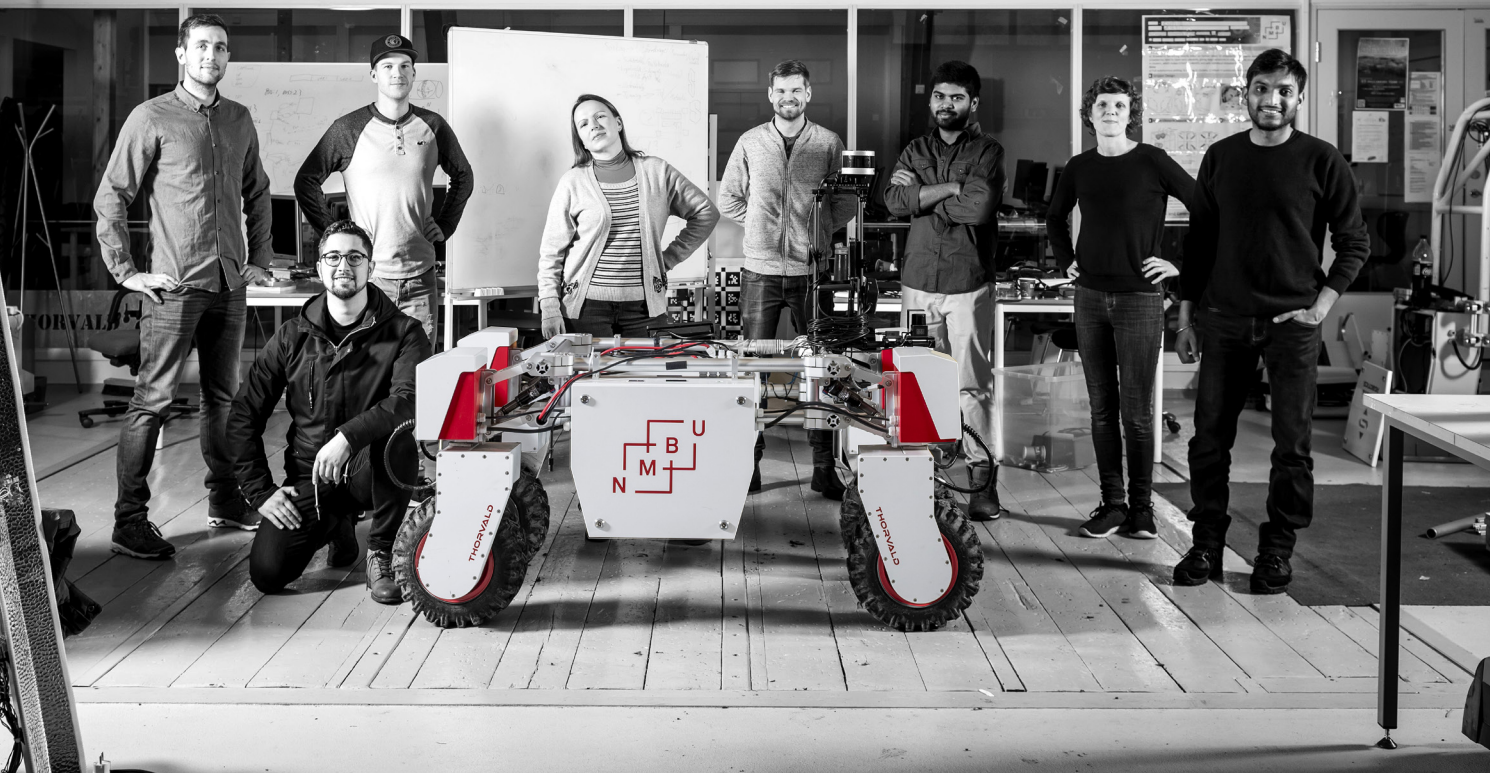


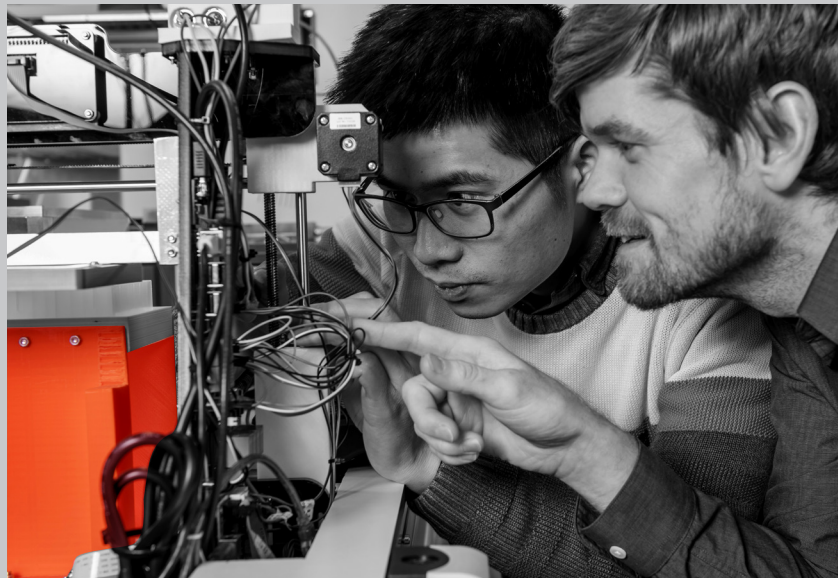


Norwegian University  
of Life Sciences



# STRATEGY 2019–2023

## Faculty of Science and Technology (REALTEK)



## REALTEK in 2018

**We educate students in science and technology with an emphasis on the environment and sustainability**

Any strategy must start by assessing the current status. What is REALTEK today? The Faculty of Science and Technology (REALTEK) offers a range of bachelor's, master's and PhD programmes in science, technology and innovation. We educate civil engineers and secondary education science teachers. On our programmes, students acquire knowledge and skills for the future, learning through research-informed teaching and critical thinking. Our students learn to be problem solvers through practical exercises, collaboration with industry, and interdisciplinary assignments. An NMBU education also ensures that the students learn to see their subjects in an environmental and sustainability perspective. REALTEK offers programme options such as environmental physics and renewable energy; mechanics, process engineering, and product development; applied mathematics; computer science; robotics; geomatics; industrial economics; construction and architecture; water and environmental engineering; as well as secondary school teacher education in natural sciences and use of natural resources such as in agriculture, forestry and aquaculture." In addition, we offer a programme in educational theory and practice. All our study programmes build on a solid foundation of mathematics, computer science and physics. REALTEK is also responsible for teaching these subjects to students in other faculties at NMBU.

## Research in a broad area

To ensure our teaching is research-based, REALTEK conducts research in a broad range of technologies and applications. In addition, the faculty hosts the EIK Ideverksted makerspace – a voluntary association that gives students the opportunity to work on innovation projects in collaboration with industrial partners. Several of the REALTEK’s teaching and research activities are undertaken in partnership with EIK.

Research activities are conducted across organisational divisions, in collaboration with other faculties, industry and other institutes. Examples of the sections’ research areas:

**Geomatics** All processes within geomatics have now been digitalised. Examples of research areas include remote sensors and radars, geographical analysis, geospatial big data exploration, gravimetry to determine sea level, 3D modelling for building information models, BIM and navigational calculations.

**Mechanics and process engineering** This section has a large robotics research group that works on a variety of projects. In addition, research is being done into a wide range of applied technologies that can support the green shift: biorefining, production techniques for aquaculture, intelligent transport systems, robots for the maintenance of high voltage lines, and robots for agriculture.

**Applied mathematics** Research relates to applied and computational mathematics. Areas of application include system biology, physics, engineering, and data analysis.

**Natural sciences** This section conducts research within energy physics, environmental physics and data science, biophysics and data science, and biorefining in collaboration with Mechanics and process engineering. Research results in this area can in turn be developed for solar power and solar heating, power systems, molten salt physics, biofuels, field stations for bioclimatic studies, hyperspectral imaging, new digital power systems, neural simulation technology, neurophysics, deep learning and machine learning in medical diagnostics, and reactor and catalysis engineering.

**Learning and teacher education** This section has an overarching vision for research of *Education for Sustainable Development* (UBU), with the aim that research findings will provide a foundation for research-based education with a clear focus on sustainability. Research in this area covers learning and teaching, such as how best to engage students in natural sciences and the use of natural resources in schools, pedagogy, and teaching at the intersection of art, science and education. There is also research related to educational fields such as supervision pedagogy, university teaching, and school development, locally and internationally. Much of the research is closely related to practice, and action research is a key research strategy.

**Construction, water and environmental engineering** Research within Construction concentrates largely on structural engineering, but other topics are also covered, such as: building management and procurement strategies; universal design; school buildings; daylight, sun shading and views; timber construction; air tightness; climate impacts on buildings and infrastructure (snow, precipitation, wind); energy in buildings; and decomposition of building materials. Within water, research is characterised by a number of national and international projects related to: purification of drinking water and wastewater; transportation of drinking water and wastewater; urban hydrology, flooding and local surface water management; and efficient recycling of resources in wastewater.





## REALTEK in 2023

### “I am proud to present the faculty’s new strategy”

The strategy work was initiated by the Faculty Board in 2017, and the Board has played an active role in shaping the strategy. It stakes out a direction for REALTEK and gives an image of where we want to be in 2023. It describes our vision for the future centred around four overarching goals. Most importantly, it expresses our ambitions and solutions to issues that are common to REALTEK. I would like to thank all the staff and students who have contributed to the strategy process and spent time and energy drawing up this common vision for the future.

The strategy focuses on what we are going to change and thus does not describe all the courses and activities at the faculty. However, it will affect all the students and staff. The strategy is for everyone.

Strategy is about creating meaningful change. Words must be turned into action. We will therefore also draw up action plans that are continuously updated through inclusive processes with staff and students and in dialogue with the Faculty Board. In addition, we will work with an outside-in approach to ensure that what we do and the feedback we get from the outside world are aligned.

I would also like to thank the Faculty Board for their good collaboration, my co-deans at NMBU for their valuable input, and the Rector for inspiration and direction from NMBU’s new central strategy. We are pleased to be part of a unified NMBU, and our strategy will also contribute to the University’s visions and goals for the next four years.

Anne Cathrine Gjerde, Dean



## Strategic direction

The time we live in today is often described as the fourth industrial revolution. It is characterised by widespread uncertainty as our societies change more and more rapidly. As a faculty, we must constantly revise and renew our understanding of our social mission by ensuring we see research and education in the relevant social framework. Fortunately, NMBU has an excellent starting point: NMBU is recognized as Norway's leading university in sustainability. This is a strategic position that we as a faculty want to help maintain and strengthen as we move forward. We want to make the faculty's contributions to sustainable solutions within environmental and life sciences even more concrete and impactful in a common direction defined by the UN's sustainable development goals:

**The Faculty of Sciences and Technology develops research-based knowledge and educates the professionals needed to reach the UN's sustainable development goals**

## Goal 1: Culture

REALTEK is a faculty for staff and students characterised by transparency and mutual respect, major ambitions, academic freedom, interaction and community

REALTEK is the sum total of all the people who work and study here. In order to maintain our success in attracting the best students and ensuring research funding, we must cultivate a culture that makes everyone feel that they can do their very best. Everyone – from lab technicians to professors – should feel that what they do is recognised as part of a unified faculty and university.

We will strengthen the focus on NMBU’s core values so that staff and students do not have any doubt as to what is expected of them. Our leadership, meeting culture, employee development interviews, and the way we all work and collaborate shall reflect our four core values: “transparency and mutual respect”, “major ambitions”, “academic freedom”, and “interaction and community”.

This way, our culture informs our thinking. In order to ensure succesful changes in the organization, we must put culture first. Otherwise we risk ending up making the same type of decisions as before, when our ambition was to change the status quo.

## Goal 2: Education

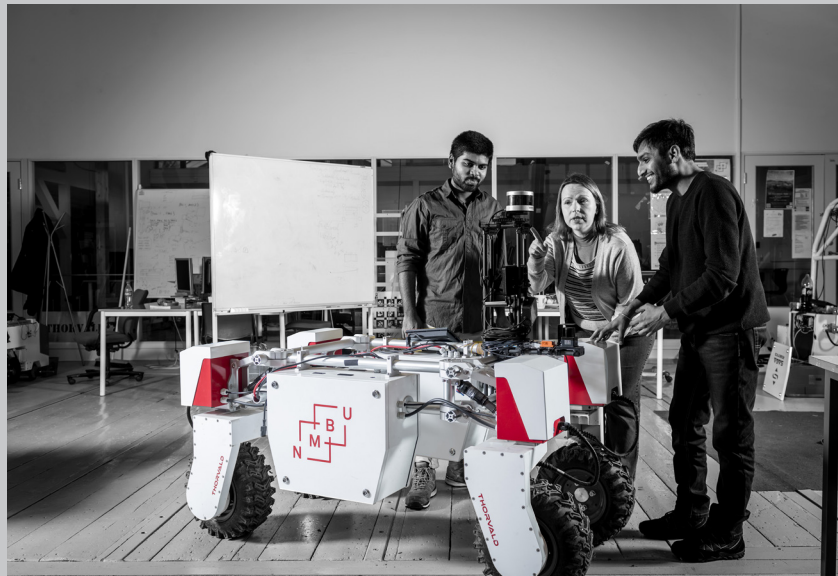
We educate graduates who are especially attractive in the work market, because they have expertise in innovation and the interaction between people, nature and technology

We educate graduates for both the current and the future job markets. Knowledge in the natural sciences is becoming ever more important for the development of our societies as digitalisation and technology is now used in virtually every area of life. At the same time, it is important that this knowledge is not isolated to technology alone, but also encompasses how and why we use technology. This is why we focus on developing expertise in innovation and problem solving in a human, environmental and sustainability perspective.

Student innovation and problem solving are largely about creativity, but what exactly is creativity? Steve Jobs, former head of Apple famously said: “Creativity is just connecting things”.

For REALTEK, “connecting things” means bringing different disciplines together through multi-disciplinary teams, connecting theory to practice in new ways inspired by start-up environments and intrapreneurship, and seeing everything in the context of the environment and sustainable development – the “green thread” that defines NMBU. These are areas where we already are well under way. The collaboration with EIK Ideverksted makerspace, practice-oriented teaching, the course “experts in teams” and the emphasis on sustainability in our education motivate our students and increase learning outcomes. We want to continue building on this and strengthen this area.





## Goal 3: Research and innovation

Our work primarily contributes towards reaching selected sustainable development goals. We have strengthened research and innovation in applied data science, education and human-centred technology

Society – schools, professional life and academia – need more research-based knowledge on learning and teaching and REALTEK’s other subject areas. Our common strategic direction will serve to strengthen the faculty’s identity and sense of unity. This means transparency regarding priorities and inspiring cooperation in research, innovation and teaching. In addition, we want to increase the impact of research and innovation at REALTEK. We will therefore give priority to selected sustainable development goals in the coming strategy period. The priorities will strengthen awareness about why we are doing research in our chosen areas and contribute to increased visibility and impact.

Both “data science” and “life science technologies” are expected to be added to the EU’s list of Key Enabling Technologies in conjunction with the new framework programme for research and innovation, Horizon Europe. It is therefore important to link REALTEK’s strategy and potential to this, i.e. emphasise technology in environmental and life sciences with a main focus on data science as a prioritized area. We are all well under way with this change, but there is still untapped potential.

We must not forget that REALTEK encompasses both natural sciences and social sciences. This is our strength and it can be further cultivated. The concept of “human-centred technology” is relatively new, but growing momentum every day. There is no decisive definition. However, we will add meaning to the term in our own way. This will provide exciting new opportunities for ensuring that the research, education and innovation at REALTEK is unique and in demand in society at large.



## Goal 4: Organisation

### An efficient organisation adapted to the strategy

System, structure and process are basic elements of a quality-conscious organisation. A good organisation frees resources for planning and development work, as well as teaching and research. We will improve our administrative processes and routines through streamlining and communication. The organisation will be adapted in line with the strategy through an open, inclusive process. Increased professionalisation will be achieved in close interaction with the rest of NMBU to ensure top quality at every level: for example, academic and administrative managers will undergo regular leadership development programmes, and we will ensure continued professional development for the administration. We need to maintain a clear focus on developing a target-oriented strategy. Wherever possible, we will develop norms so that everyone knows what is required and what to expect. A culture of dialogue will be our trademark in the form of active involvement of employees, employee representatives and managers in everything that affects the faculty's development and quality.



