Innovating Engineering Education for Tomorrow’s Engineer
About 4TU.CEE

Are you involved in engineering education and looking for tools, best practices and research that will help you educate ‘futureproof’ engineers? The 4TU.Centre for Engineering Education (4TU.CEE) contributes to the provision of inspiring and effective engineering education by facilitating innovations in education programmes within and outside the Netherlands. Innovations in engineering education are needed to optimally prepare our future engineers for coping with the societal challenges of the 21st century. 4TU.CEE is your starting point for educational innovations at our four universities of technology.

4TU.CEE has been founded by the 4TU.Federation, an alliance between Delft University of Technology (TU Delft), Eindhoven University of Technology (TU/e), the University of Twente (UT) and Wageningen University & Research (WUR). Its main goals are to jointly innovate engineering education and share expertise on educational innovations.

4TU.CEE’s focus is on innovating engineering education to stimulate design-based, sustainable and interdisciplinary engineering education. This is what distinguishes the centre from other cooperative activities between universities in the Netherlands.

For whom? 4TU.CEE is the place for lecturers and scientists with questions and ambitions relating to engineering education.

The world is in need of more and differently trained engineers who are able to tackle the major societal challenges in the fields of energy, safety and security, health, mobility and the environment.
Activities

At 4TU.CEE we establish networks connecting teachers, scientists, support staff and international colleagues involved in educational innovations. We continuously map, survey and communicate recent innovations, trends, tools, research evidence and advancements at the four universities.

We instigate projects that contribute to the innovation of engineering education. Besides publications, ranging from reports to conference contributions and journal articles, we organise activities, such as workshops and meetings on both a large and small scale. This enables education staff to learn about innovations, exchange ideas and actively participate.

For these activities, the 4TU.CEE website, and in particular the networks of 4TU.CEE staff at the universities, provide a platform for staff to share expertise.

Innovations

Implementing interdisciplinary engineering courses, enhancing students’ engineering approaches, stimulating entrepreneurial mind-sets, working with virtual labs and in innovation spaces, organising feedback for learning, conjoining maths and physics courses into engineering domains, and supporting our teaching staff with innovative teaching and learning strategies for professional development, are just a few examples of educational innovations taking place at the universities of technology in Delft, Eindhoven, Twente and Wageningen.

4TU.nl/cee

Mission

To jointly inspire, stimulate, support and disseminate effective and high-quality engineering education through research-based innovations.

Vision

To help provide inspiring and effective engineering education that will prepare engineers for major societal challenges by facilitating innovations in education programmes within and outside the Netherlands.

Myriam Cloodt - Assistant Professor of Innovation Technology Entrepreneurship & Marketing at TU/e

“Just by sharing experiences of the 4TU.CEE projects, you already gain valuable new insights.”
Topics of Interest

At each institution, 4TU.CEE identifies typical trends and innovations in engineering education, which are relevant for teaching staff and programme management.

4TU.CEE has identified the following contemporary key topics of interest:

Future engineering skills

Specific skills that the future engineer is expected to develop are: dealing with uncertainty, ambiguity and risks; problem solving; leadership and integrating enterprise systems engineering.

Entrepreneurial thinking has been recognised by industry as one of the skills engineering students need in order to be optimally prepared for the job market. 4TU.CEE supports the implementation of these future engineering skills in engineering education, including using new types of teaching and learning environments, for example innovation spaces or start-ups.

Curriculum development

4TU.CEE has mapped the engineering curriculum and course designs at institutional, programme and course level. Changes in engineering roles and profiles have been identified. A framework is now being developed, together with teachers and educational experts, to embed engineering profiles and skills in the curriculum in disciplinary courses, and in research/design projects. A team-based approach not only contributes to innovative curriculum design but also offers opportunities for further professional development of our teaching staff.

Emerging technologies

4TU.CEE wants to investigate, test and support the use of upcoming technologies, with respect to enhanced learning gains and other educational benefits. Virtual labs, remote labs and virtual reality systems are of special interest here. Moreover, we further engage in efforts to improve blended learning designs in mathematical education.

Interdisciplinary engineering education

Interdisciplinary education is about solving problems that draw on multiple disciplines, within and outside of the engineering domain. It is about integrating information, data techniques, tools, perspectives, concepts and theories from two or more disciplines. Interdisciplinary learning is one of the central characteristics of both contemporary engineering education and design-based education.

4TU.CEE has developed a checklist, together with assessment guidelines in interdisciplinary education, which can help to implement interdisciplinary education with congruent assessment methods. 4TU.CEE is also involved in integrating mathematics and physics into engineering education.

Engineering education for all

Research shows that student activity can be enhanced by combining a variety of teaching methods. This can be a challenge in large-scale lectures, and an ever-growing student population, especially for engineering classes. Students need to gain hands-on experience in labs, which are (at the moment) not suited for large groups. How can one offer an engaging education programme when there is a lack of facilities and only limited availability of the costly materials needed in class? 4TU.CEE conducts research on this topic and collects examples of promising practices.

English medium instruction is another topic that needs attention, with a growing international student population, as is the ability for students and lecturers to work in an intercultural setting.

Teaching excellence

4TU.CEE is keen to improve the balance between research and education in career paths of university staff. To achieve this goal, we work together with a group of international universities on teaching excellence. A model has been developed to improve the transferability of professional development accreditations across universities, in the Netherlands as well as abroad. The project also provides means to enhance the evaluation of educational achievements in relation to career steps. Different models and evaluation approaches are now being tested.
4TU.CEE supports teaching staff by providing access to tools, research results and promising practices through our Innovation Map. Learn more about the engineering education innovations by visiting the Innovation Map on the 4TU.CEE website:

4TU.nl/cee

The Innovation Map provides you with detailed information on the innovation topic areas and projects, including contact details of programme coordinators. Alternatively, you can share your innovation projects on the Innovation Map, so that others can benefit from your knowledge and experience. To do so, please contact our 4TU.CEE programme coordinators. Their contact details can be found on the back of this brochure.
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