

TU Delft Vision on Education



Herewith we proudly present our renewed TU Delft Vision on Education.

This document is the result of an extensive consultation process by the executive board, the deans and directors of education of our eight faculties with our students, academic and support staff, and our external partners. We want to thank everybody who participated in this process for their valuable contributions.

We would like to express our gratitude to a few colleagues who have contributed significantly to this vision. First of all we would like to thank Aldert Kamp and Renate Klaassen of the Centre of Engineering Education (CEE). Aldert and Renate facilitated the 'Free Spirits ThinkTank' consisting of teachers who set out to design future graduation profiles based on the possible impact of long term political, economic, social and technological trends. Secondly, we would like to thank Rob Mudde and Tessa van Puijenbroek for their input and support during the many interactive sessions with the board, deans, directors of education and faculty sessions with students and teachers. Finally, we would like to thank Ellen Bos and Linda Verbeek for facilitating the whole process and integrating the feedback of all participants in the final draft of this vision.

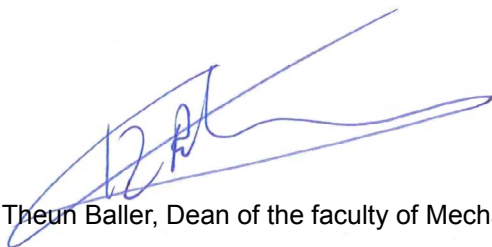
We hope this vision will inspire you!

On behalf of the executive board:



Anka Mulder, Vice President of Education and Internationalization

On behalf of the Deans of the TU Delft:



Theun Baller, Dean of the faculty of Mechanics, Maritime & Materials Engineering (3mE)

On behalf of the directors of the University Services:



Timo Kos, Director of Education and Student Affairs

TU Delft Vision on Education

This document contains Delft University of Technology's vision on education. It describes our educational goals and quality ambitions, and states directions for further development of our educational portfolio and our way of teaching and learning.

November 2017

Introduction

In 2011 we described our vision on education as part of the TU Delft Roadmap 2020. Based on this vision we have undertaken several initiatives to further improve the quality of our education. Examples of these initiatives are the Study Success Programme, the realisation of the Graduate and Extension School and the programme 'Education in the Spotlight'.

Due to developments within and outside our university, we need to redefine our vision on education. In drawing up the new vision we have taken the following developments into account:

- increasing pace of technological change
- globalisation and the accelerating digitisation of our economy and social interactions
- a strong growth in the international mobility of both students and staff
- changing features of our student population as a consequence of the changes in society
- shifts in the public funding of higher education
- rising enrolments leading to a larger student population and increased pressure on our staff and facilities
- growing competition for research funding
- the challenge of balancing our education, research and valorisation activities
- the breakthrough of massive open online courses (MOOCs) and other forms of digitally enhanced teaching and learning.

This document contains the updated vision on education of the Technische Universiteit Delft. It describes our educational goals and quality ambitions with regard to our graduates, our educational portfolio, our approach to teaching and learning and our people and academic community. Furthermore for each of the above topics directions for further development are stated.

This vision on education will be used as a framework for further development of our educational portfolio and renewal of educational programmes and translated into a teaching and learning strategy for the coming six years. It will be an integral part of the new institutional Strategisch Kader 2018-2024 (Strategic Framework 2018-2024).

This document with the vision and the new TU Delft Strategisch Kader 2018-2024 (Strategic Framework 2018-2024) will give direction to the development of new policies on educational related subjects like internationalisation, selection, continuous development of academic staff, continuous professional development of working professionals including alumni, expansion and renovation of education facilities and teacher and learning support services.



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Educational goals and quality ambitions

- We provide high quality education and an inspiring, engaging and attractive study environment, which enables students to develop themselves into critical, result-oriented and socially responsible engineers.
- The culture of TU Delft stimulates and supports ambitious and enterprising students and staff. We expect our students to take full advantage of the education we offer and the opportunity to work with our leading academics and world-class facilities.
- We expect our students to adhere to our core values as stated in our Code of Honour and Code of Ethics:
 - Carry out their duties with commitment, transparency and integrity
 - Contribute to an inspiring work and study environment
 - Trust each other and avoid conflicts of interest.
- We encourage students to develop themselves not only academically but also personally by participating in social, sport, and cultural activities, such as the ones offered by the university, student clubs, student associations and the city of Delft.
- We stand for academic freedom and foster an inclusive¹ academic culture in terms of functional impairment, gender, sexual orientation, cultural or religious background.
- We strive to uphold and further strengthen the brand of the 'Delft engineer'.
- We share our knowledge with alumni, scientists and other learners all over the world and let these connections inspire us.

¹ 'Inclusive' means: creating an environment that is accessible for all students regardless of their backgrounds, special needs or other unique situations.



Directions for further development:

1. Managing growth

Accommodating the steadily increasing population of students is a growing organisational challenge. Given the societal need for engineers we would like to graduate as many as possible. But due to scarcity of academic teaching staff, slowly decreasing public funding per student, and our ambition to further improve our educational quality, growth cannot be sustained indefinitely.

In order to safeguard the quality of our education, we intend to develop policies and tools to manage the growth and total size of our student population in a more controlled manner. Analyses based on the current funding scheme show a preferential scenario in which we grow to approximately 25000 students. This number fits with our identity and surroundings.

In order to achieve controlled growth we will develop an integral capacity plan which may include policy proposals regarding (amongst others):

- *total capacity and work balance of academic teaching staff*
- *instruments to influence the quantity and quality of intake of students (matching, selection, numerus clausus, etc.)*
- *controlled intake of international students*
- *campus facilities*

Our graduates



It is our goal to educate graduates who are able to develop technological solutions for society's problems. We want our graduates to be acknowledged by the professional field and society. The TU Delft engineers stand out because of:

- their mastery of the scientific foundations of engineering
- the thoroughness and depth of their disciplinary knowledge
- their analytical & modelling skills
- their problem solving skills, the hands-on mentality and the attitude of getting things done
- their ability and attitude to adapt to changing conditions and environments ('they have learned to learn')
- their leadership in designing creative, socially responsible and innovative technological solutions for societal challenges
- their ability for effective inter- en multidisciplinary teamwork in international and culturally diverse environments
- their digital skills, such as programming and data analysis
- their ability to reflect on the impact of technological solutions in their socio-economic context, including ethical dilemma's.

All Graduates of the TU Delft are therefore expected to master the following core competences for engineers² :

- critical thinking and reflection
- carrying out research
- designing
- developing an academic approach
- communication and collaboration in interdisciplinary and intercultural teams
- taking into account the temporal and social context of technological solutions.

The level of achievement of these competences depends on the level of the programme (BSc, MSc or PhD).

² Meijers, A.W.M., van Overveld, C.W.A.M., Perrenet, J.C. (2005). Criteria for academic bachelor's and master's curricula.



Directions for further development:

The expectations regarding our graduates are constantly evolving in line with technological and social developments. Furthermore, major social and economic challenges, like the UN Sustainable Development Goals, require innovative technological solutions and cross-disciplinary collaboration.

2. Diversifying our portfolio

When expanding our portfolio of educational programmes we aim to strengthen it with multi- and interdisciplinary programmes that align with, and are complementary to our current disciplinary programmes.

3. Personalizing graduation profiles

In our MSc programmes we will create room for different graduation profiles by offering our students the possibility to choose electives in their programme.

4. Educating for a digital world

In the near future, digital skills will be needed in almost every profession, certainly in engineering. For that reason, all TU Delft programmes will include digital skills relevant to that particular domain.

Our educational portfolio



We strive to offer a comprehensive portfolio of bachelor, master, doctoral and professional courses and programmes in the fields of science, design and engineering that are internationally acknowledged as world class. We benchmark this quality ambition internationally.

All our educational programmes are aligned with - and embedded in - the research fields in which our faculties are scientific leaders themselves.

Our educational portfolio consists of:

- a set of bachelor programmes covering the full breadth of engineering sciences which are characterized by their strong disciplinary focus, leading to a Bachelor of Science (BSc) degree. All our bachelor programmes have a nominal duration of three full-time academic years (equivalent of 180 European credits)
- a variety of master programmes which are not only closely aligned with our research strengths but also have a design focus. The programmes range from strongly disciplinary oriented to inter- and multidisciplinary programmes, leading to a Master of Science (MSc) degree. Our default master programmes have a nominal duration of two full-time academic years (equivalent of 120 European credits)
- doctoral programmes with a nominal duration of four full-time academic years, which lead to a Doctor of Philosophy (PhD) degree
- a select number of specific Professional Doctorate in Engineering (PDEng) programmes, focused on becoming a technological designer for Industry. PDEng programmes have a nominal duration of 2 full-time academic years
- opportunities for students to personalize their graduation profile and pursue their own interests by including elective elements in- or extra-curricular modules on top of - their compulsory curricula, such as:
 - minors (30 EC of the 180 BSc credits)
 - elective courses (BSc and/or MSc)
 - tracks, specialisations and annotations
 - honours programme (BSc and/or MSc)
 - double degree programmes (BSc, MSc, PhD)
 - student competition projects (Dreamteams)
 - study abroad
 - internships
 - graduation projects
 - doctoral education programme for general academic and transferable skills
- a variety of professional and post-academic courses and continuous education programmes for working professionals, leading to professional certificates, advanced science diploma's or advanced science degrees.



Directions for further development:

5. Challenge based didactics

TU Delft's strategy towards further development and innovation of teaching and learning has focused on stimulating diverse forms of active learning and the use of digital technologies. In the coming years we would like to raise the bar even further, and create a didactical approach in which students are challenged in a way that is comparable to, and inspired by, the way they get inspired by being member of one of our DreamTeams.

We will develop a 'challenge based didactical approach' in which students will be inspired to collaborate in project teams, focused on applying their scientific and engineering knowledge and developing those (collaboration) competences and skills to solve real world engineering challenges.

6. Research into Higher Education: evidence based education

Digital technology makes it easier to carry-out research into higher education and enables us to develop evidence based teaching methods. TU Delft has developed some expertise in this field in the last few years and wants to strengthen this in cooperation with its partners in the Netherlands and internationally.

7. Vision on campus of the future

We will create a new vision on the campus of the future in relation to the developments in online and campus based learning and the added value we want to offer students when they are on campus.

Our approach to teaching and learning



We aim to provide a stimulating and engaging learning experience. Therefore the TU Delft:

- stimulates and supports ambitious and enterprising students
- enables academic staff to excel in education, educational leadership and/or educational research
- has an educational management and support organization focused on facilitating students and teachers to excel in learning and teaching.

We see it as our responsibility to guide students and PhD candidates to take control of their own development and learning process. Features of our teaching are:

- we combine state-of-the art scientific theory with practical application
- we use diverse teaching methods to stimulate active learning
- we use digital technologies, such as online- and blended learning, to enhance teaching & learning
- we train students to apply and integrate knowledge and skills in interdisciplinary tasks
- we train students to cooperate with students from different disciplines and backgrounds in order to solve multidisciplinary tasks
- we confront students with the context of their future professional practice
- we prepare students for lifelong learning.

This requires from students that they:

- are eager to learn and show an active and engaged study attitude
- have the ambition to make the most of their study period at the TU Delft and develop themselves academically as well as personally
- make effective use of the time of our academic staff providing instruction, coaching and supervision
- responsibly use the world class facilities we provide for education and research.

This requires from our academic staff that they:

- display a passion to share their knowledge and inspire and challenge students
- translate theory to practical application
- have the didactical and organisational skills to provide high quality courses
- take responsibility, not only for their course(s) but for the quality of the whole programme
- are open to learn – or contribute to experimenting with - new (evidence based) teaching and assessment concepts for engineering education
- introduce students to their academic and business networks
- continuously strive to develop and improve themselves as teachers, supervisors and educational leaders.

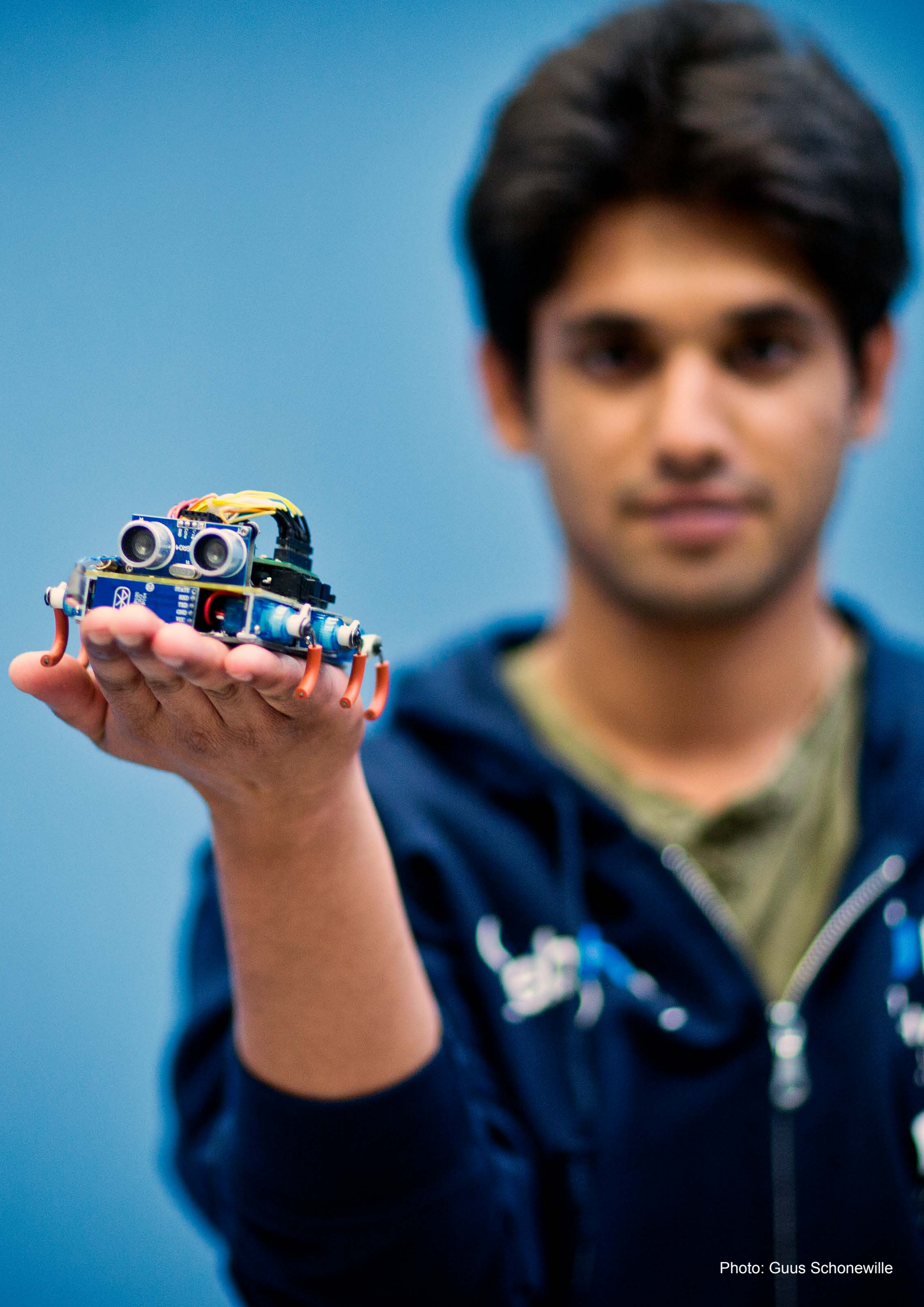


Photo: Guus Schonewille

Directions for further development:

8. Careers in education

The balance between education, research and other activities of academic staff is under pressure and needs to be further improved. We create a culture and structure in which teaching excellence is acknowledged in terms of further development as well as career opportunities. Teaching excellence and leadership in education will be weighed on par with research excellence and leadership in research when promoting staff to higher academic positions.

9. Strengthen continuous professional development

We will strengthen our connection with alumni and the professional fields in order to create (virtual) networks around selected global engineering challenges in which research collaboration, knowledge dissemination and collaboration on solving societal challenges will take place. We will involve our alumni and professional fields more actively in our educational programmes.

Our academic community



Science has no borders, and social and economic challenges increasingly manifest themselves on a global scale. Solving these will require cross disciplinary, cross national and cross cultural collaboration, which can only flourish in an open academic community that is inclusive and stands firm for academic freedom. We are proud of our strong roots in Delft and our national, cultural and scientific heritage. We therefore:

- maintain close ties with our local and regional community and cherish our strong roots in Delft and the Netherlands
- guard our open and culturally diverse academic community by welcoming all students and staff, regardless of their gender, sexual orientation, cultural or religious background
- expect members of our academic community all to adhere to our core academic values and respectfully work together
- stimulate international collaboration
- strive to maintain a healthy balance between Dutch and international students in order to provide them a truly international campus experience.
- provide incoming international students and staff the opportunity to learn Dutch and get acquainted with the wider Dutch culture and society.

We believe that in a flourishing academic community, research and education go hand in hand. Therefore, in principle, tenured academic staff are involved in both research and education to ensure alignment between the two. We:

- make sure that our educational programmes are aligned with the latest developments in research
- stimulate our academic teaching staff to continuously develop themselves, both as researchers as well as teachers
- strive for a healthy balance between research and teaching activities
- reward teaching excellence and provide clear career paths for academic teaching staff which takes into account their teaching achievements.

We believe that it is important that students seize the opportunity to develop themselves personally while studying at our university. A distinguishing trait of TU Delft is the vibrant academic culture and the rich pallet of extracurricular activities available to students. These activities provide ample opportunities to strengthen social and interpersonal skills. These should be open to all students and support the diversity of our community. To facilitate this, we:

- value and support students who are actively involved in education and the university governance, e.g. in education boards, study associations and student councils
- offer facilities and support for a variety of extra-curricular activities, from scientific and career orientation events to cultural activities and sports
- value and support students who choose to be actively involved in governing positions of student clubs, student associations and student projects.

As an open academic community we see it as part of our public mission to:

- share latest insights from our research with our students, alumni, working professionals and learners all over the world and become a learning community in which we learn and collaborate to solve the challenges of our time
- share our courses and course materials with a global public by publishing them under an open license that allows re-use for non-commercial ends.



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