

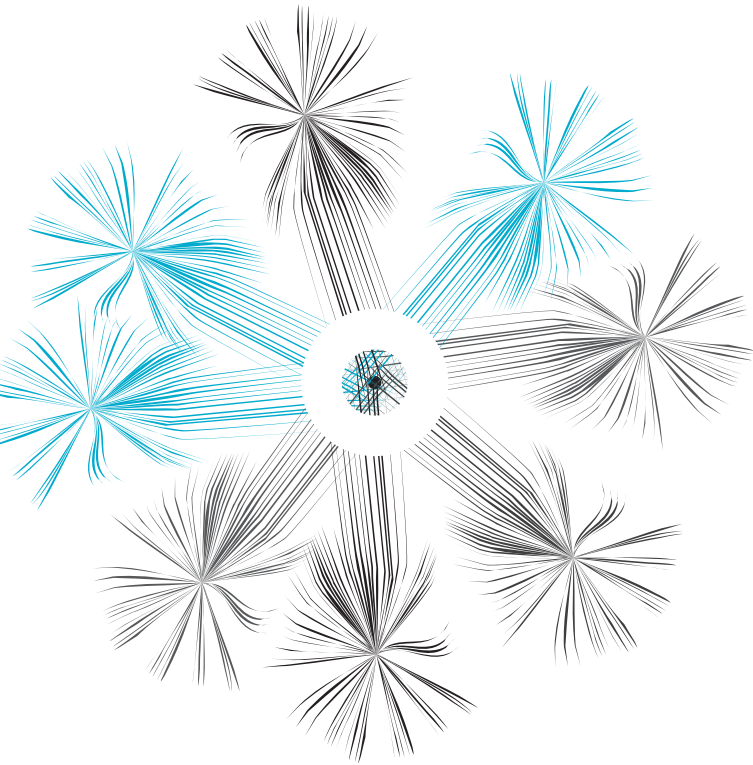
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THE TWENTE EDUCATION MODEL



UNIVERSITY OF TWENTE.





THE TWENTE EDUCATION MODEL

The University of Twente has a distinctive education model for its undergraduate programmes: the Twente Education Model (Twents OnderwijsModel). The model is closely linked to the profile of the university as an institution of research and teaching that seeks to combine perspectives from sciences and social sciences.

The University of Twente is a university of technology. Research and teaching are aimed at designing technology-inspired solutions for real life challenges. The university's motto – High Tech, Human Touch – expresses how technology is seen as an inherent part of modern society, and how human aspects are seen as an integral part to any engineering challenge. This approach to science and technology has direct consequences for the way teaching is organized at the university, with respect to the conceptual development of students, as well as with respect to developing skills and attitude.

The aim of this brochure is to give some background information about TOM and to lay out the basic principles of the model. More in-depth information, guides to designing TOM-modules, and personal stories from staff and students working with TOM can be found at www.utwente.nl/tom





WHY TOM?

The reason that the University of Twente chose to develop a distinctive approach to learning is directly related to the specific profile and focus of the institution. Traditionally, the boundaries between disciplines are reflected in the organization of the university and, as a consequence, in the curriculum of its programmes. As the University of Twente seeks an interdisciplinary approach to its teaching and research, it is logical to avoid pre-structuring programmes by discipline or organizational sub-divisions. In TOM the curriculum is structured by themes or challenges. This is a main reason why TOM is modular and project-based.

OUR STUDENT'S FUTURE

What is our student's future? Many of the professions highly skilled people have today, were unheard of only 20 years ago. Similarly, it is hard to predict what current students will be doing 20 years from now. It is likely they will work in a very complex and rapidly changing environment. Their jobs are also likely to be less secure and permanent than they are now, not just because of the volatile nature of the globalized economic system, but also because automation and other technologies keep developing at an ever-increasing pace.

There is wide consensus that future professionals will need more than specialized knowledge. To be successful in a dynamic labor market, they need the flexibility to, in the words of Alvin Toffler, "learn, unlearn and relearn". Moreover, surveys show how employers increasingly demand organizational and communication skills, along with general academic, problem-solving, and co-creation skills. This is not to say that students do not need any specialized knowledge. What these surveys also show is that in spite of all the talk about the importance of 21st century skills, it is still mostly a degree in a recognizable field of study that gets students their first job. A degree gets students a job; skills get them a career. Of course expert knowledge is more than just a ticket to the workforce. It has a clear value of its own. The world needs experts. Moreover, from a didactical perspective, specialization is also a way to learn to develop and use knowledge at a deep, abstract level.

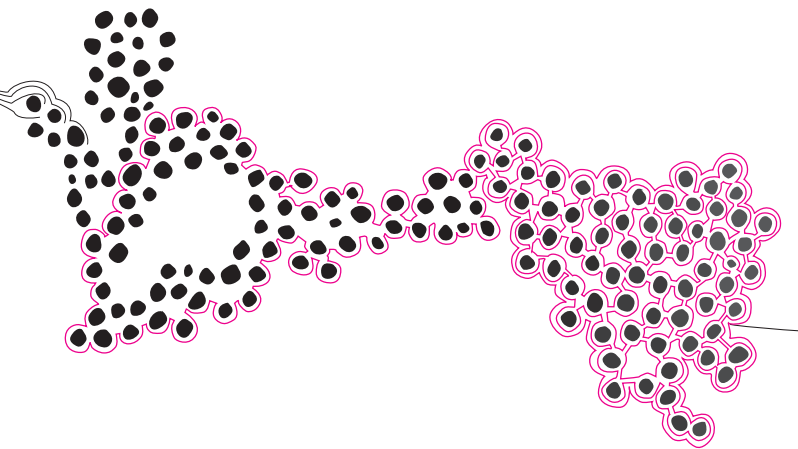
INTERDISCIPLINARITY

In a university program, students have to develop a wide range of skills that enable them to transpose expert knowledge to different domains, and to

communicate and interact with people from other disciplines. These skills rest on a foundation that is provided by academic depth in a subject or discipline. So it is breadth resting on depth, like the letter T. So-called "T-shaped professionals" have deep knowledge and understanding of their field; they can add to this knowledge, but can also venture off the beaten track and find new applications for their expertise.

MORE THAN A VISION ...

TOM is not just about vision and didactics. Universities in the Netherlands are also investing a lot of resources in increasing student retention and increasing the enrolment of students. TOM wants to offer more variety in learning methods and more options to follow specific interests, specifically in projects and in elective modules. This should lead to a more diverse and, over time, larger population of students. At the same time, the curriculum design and the intensity of the programmes should help students discover early on if they can manage the pace and, if they do, keep them on track. These are not just goals the university has set for itself. They are also goals the university agreed on with the Dutch Government. In so-called performance agreements, all Dutch institutions of higher education have translated their ambitions into concrete performance indicators. For the design of TOM, relevant ambitions are that student dropout rates are to be below 30% and students should have at least 20 hours of guided activities (not per se classroom teaching) per week in the first year of the curriculum.



DIDACTICAL AND ORGANISATIONAL FOUNDATION

Over the years, a lot of research has gone into the question 'what makes learning effective?' Of course it is not possible to summarize the findings of this research in a small number of principles without gross oversimplification. Nonetheless, these are the didactical and organizational principles that are the foundation for TOM:

1. a steady workload is better than 'binge learning' for tests,
2. frequent feedback helps students adjust their learning,
3. variety in teaching methods keeps students engaged,
4. community helps students help each other,
5. ambitions must be clear and high, yet realistic,
6. and teachers work best in teams, with minimal regulation.



WHAT IS TOM?

TOM is the model with which the University of Twente decided to match its vision and goals for undergraduate education to insights from the study of higher education.

There are three core aspects of TOM:

1. **Three professional roles,**
2. **Student-driven learning, and**
3. **Module and project-based work.**

1. THREE PROFESSIONAL ROLES

The University of Twente wants to train highly skilled professionals who are able to critically assess, combine and apply scientific knowledge, and to add new knowledge. According to the UT's vision on teaching, students must learn to function in three roles to achieve this: being a researcher, a designer, and an organizer.

The best way to learn this is by taking on these roles in the curriculum by working on projects as soon as possible. Throughout their studies, students can discover which roles suit them best. They become adept in a certain field of learning, but will also discover where their true strengths are lying - professionally and personally.

2. STUDENT-DRIVEN LEARNING

Flexibility and an entrepreneurial attitude are not developed in a lecture hall. To better prepare students for an uncertain future, the aim is to have them at the helm of their education as much as possible. This approach to learning is what we call Student-driven Learning (SDL).

In SDL students can make decisions in what they want to learn, how they want to learn and when, but this does not mean that students decide on all these aspects. Some of these aspects can be more 'student-driven' than others.

In its current form, TOM is made student-driven mostly by projects that not only help students assess their understanding and develop skills, but also invite them to ask new questions and seek other ways of learning. However, module designers can go further and find other ways of activating students and making them less dependent on course-book lecturing.

Read the Student-driven Learning brochure for more information about SDL at the University of Twente.

🔗 www.utwente.nl/sdl

3. MODULE AND PROJECT-BASED WORK

All our bachelor programmes consist of modules, organized in 10-week, fulltime thematic units of each 15 ECTS. Every module has a theme with all sorts of subjects and learning activities, such as feedback sessions with students, workshops and lectures. Central to each module is a project in which students address a real-world problem. This way, students put scientific theory into practice. Challenging and exciting!

A CLOSER LOOK

TOM-modules preferably utilise different educational methods. One method, in which the University of Twente has a long tradition, is project-led education. TOM sets this method centre stage. Below is an elaboration on. Below elaborates on project-led education, the module structure, assessment in TOM and finally the overall curriculum structure of our bachelor programmes.

PROJECT-LED EDUCATION

Project-led education has a number of advantages. It is a very active method that involves students in their learning. For their project, students need to choose a focus and a method, make a plan, appoint roles, etc. The latter are not mere skills to learn; they can also be ways to assess and develop talents, and to follow specific interests.

In essence, a project is a challenge that invites students to independently gain knowledge and skills. A typical project will be done in a small group, but it can also be a solo endeavour. Within a project, a student can take on specific roles. A student can work on critically assessing existing knowledge and systematically adding new knowledge (researching), integrate this knowledge in the development of a solution for a well-defined problem (designing), or work on matching solutions to a highly complex context (organizing). In projects that provide a variety of roles, students can focus on one of the roles or perhaps combine roles. This is a good way to train different aspects of the specific Twente academic profile.

Group projects also offer the opportunity of developing collaboration skills. Moreover, explaining a problem or a solution to peers is a great way for students to learn and assess their own understanding. This is not to say there will not be any free riding in projects. Fortunately, group-pressure, well-trained tutors, and sufficient individual assessments have proven to be good instruments to counter that risk.

The extent to which the project is pre-defined can depend on the type of programme, the position of the module including the project in the programme, and the learning objectives of the module. In a very open project the outcome is not fixed in advance, while in a more closed project this is the case. However, in a less open project it is still possible to offer open assignments in fixed knowledge sections.



THERMODYNAMICS PROJECT

In this movie Applied Physics student Stan Verstappen is followed in the 'Thermodynamics' project. In this project students from Advanced Technology and Applied Physics are working on thermodynamics and design, building a cooler. Students take different roles and complement each other maximally by the interdisciplinary character of the process. At the end of the project there is a contest who built the best cooler.

🔗 [HTTPS://VIMEO.COM/211915902](https://vimeo.com/211915902)

TOM does not prescribe the size of the project part in a module. Yet, project-led education is intended to be just that: learning, or more specifically, learning at an academic level, as opposed to mere training. The aim of the project is not only to apply the knowledge and skills gained elsewhere, but also to gain new knowledge through self-articulated questions, such as ‘how does this work?’, ‘is there research for this?’ or ‘can we use this in a totally different way?’ Formulating and answering questions like these, takes time.

MODULE STRUCTURE

Modules can consist of different parts. Preferably, these are not parallel courses like in traditional quarters or semesters, but sequential events to allow for student focus. Full-time availability of students allows for maximum flexibility in the schedule. The designers of the module can, for example, have their students do mechanics for a full week, or schedule variation in the time students have to work on a project over the course of a module. This flexibility also makes it easier to offer diverse teaching methods. The balance between time spent on a project or on lectures, skills training, lab-assignments, tutorials, discussion groups, etc., can change more easily over the course of a module. Research shows this variation is important for motivation and for the effectiveness of learning. Variation in teaching methods keeps students alert and increases the chance that students with different learning styles can still succeed.

It is important that a module is focused on a clearly defined theme or subject. Designing the educational activities around a theme ensures internal coherence. The individual activities become more meaningful to students in that they get to see the bigger picture.

And of course, not all learning has to take place in the time allotted by teachers. How much structure a module should offer to the student is a matter of lively debate. There is a fairly wide consensus that actively engaging students presupposes that students can actually take responsibility. Methods for engaging students can include simple things



PROJECT CONSUMER PRODUCTS

In Module 6, ‘Consumer products’, students from Mechanical Engineering, Industrial Design and Industrial Engineering Management work together in developing a product for a real company. In 2016 they worked for IKEA. In the IKEA project students had to find a solution for a shower curtain. The mixed project teams combine their expertise in the product solution, while at the same time they consider the demands of the IKEA and the consumer group.

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like not scheduling a full week with mandatory activities, stimulating the use of sources other than a handbook or flipping the classroom.

But are all programmes and all subjects equally suitable for a student-driven learning approach? And can you start straight away, or only after a solid foundation of basic knowledge and learning skills is in place? TOM does not take a fixed position in this debate. Module teams are stimulated and supported to continuously look for ways to make their teaching more ‘student-driven’. This is a gradual process that requires discussion, careful experiments, and training.

Allowing students to take the reins themselves requires teachers to give the students this freedom. Educational activities therefore do not have to be mandatory, but the tutor can strongly recommend them. The tutor is the student’s counsellor and coach during the project implementation.

ASSESSMENT

From a didactical perspective, a module is one coherent unit of study. So, the summative tests in a module result in one final grade. This grade determines whether students pass the module and get the credits. A round off grade of at least 6 is needed. Other additional demands may apply, like minimum scores for specific sets of tests in the module. A module with only one summative test – an project report for example – is possible as well. This can be a group paper, but in that case there will also have to be some form of individual assessment.

Assessments during the module, either formative (not part of the results on the transcript) or summative, can be used to give students feedback on how they are doing. There are different ways to provide feedback, like oral, written or peer feedback. In addition, feedback can be given in various feedback moments. For example, in tutor session, review sessions, midterm project presentations etc.

Designing a good assessment plan is not an easy job. The examination board will require evidence that all learning goals for the module have been met sufficiently by a student. Yet adding a large number of summative tests not only brings students in the mode of ‘test directed studying’, it also implies the risk that students could fail a module on a single test. The solution may lie not just in assessment design at the level of individual modules, but also in the design of the full curriculum. The more coherent the module, the easier it is to design a good assessment plan. Furthermore, if progressive courses of learning are clearly defined, an examination board can assess progress on a specific subject across modules and relax the demand for a score in a specific module.

The assessment plan is the same for all students in a module and has to be published before the module starts. The module team cannot add extra summative tests – certainly not for only part of the students – during or after the module. Dutch higher education law is quite specific about that. However, it is possible to offer a student an extra chance to

do a test, in which case it can be a different kind of test. This can be decided during a module team meeting at the end of the module. These extra assessment moments are called ‘repairs’ in TOM vocabulary. They are not default re-sit options, as they are not unconditionally open to all students. For reasons of quality and accountability, it is very important that the team is transparent about these decisions and their argumentation, and aims to limit them in number.

The programmes have agreed not to schedule teaching events on the Thursday and Friday in the 10th week of each module, so students can take their repairs on these days. There are also modules in which the full last week is reserved for repairs, to allow students to finish the module in time.



FULL TIME PROGRAMMES AND CAMPUS ACTIVISM

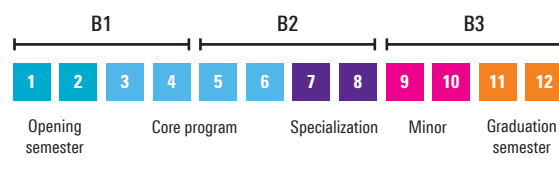
The University of Twente has a strong tradition of student activism. In many respects, campus life is run by students. This is a crucial ingredient to the campus sense of community, which is often rated by students as one of the main reasons for choosing Twente. There has been some concern about the effect the constant study load in TOM has on student activism. The problem is not so much that students have less time to spend on other activities, but rather that their schedules are often too fixed. The more student-driven modules (i.e. modules where students have more options to take responsibility for their schedule) see fewer problems. Of course the same goes for having a campus job. Deans and programme directors agreed that TOM should not limit campus activism.

UNIFORM CURRICULUM STRUCTURE

A TOM curriculum can be divided in 5 consecutive phases:

1. opening semester (modules 1 and 2),
2. core program, including referral advice or BSA (modules 3 through 6),
3. specialization (modules 7 and 8),
4. minor (modules 9 and 10), and
5. graduation semester (modules 11 and 12).

Apart from this organizational structure, the curricula share a number of educational activities. All science and technology programmes have a shared math programme in the first two semesters. Students are mixed for parts of this programme and do other parts with peers from their own program. A similar model is used for the training of research methods in social science programmes. The aim is to let students see and experience the universality of these parts of the curriculum.



OPENING SEMESTER

One goal of TOM is to help students decide whether they are in the right place as soon as

possible. The design of the first two modules is aimed at giving a good impression of the nature and content of the programme, with respect to study load. Subjects that are known to be very challenging to students preferably are integrated as a taster in these modules.

Ideally, the opening semester also focuses on 'learning to learn', with intensive tutoring. Students are appointed a study adviser for further counselling and guidance. If all goes well, the study advisor meets with the student only once during that period. If there are indications the student is under-performing or struggling in any other sense, the study advisor will meet more often with the student.

The study advisor will have already drafted advice on chances of success for students before Christmas. This is roughly halfway through the second module. The reason is that students who leave the programme before February 1 do not lose rights to state funding under Dutch law.

CORE PROGRAM

Modules three to six build on the first two modules to further develop the core of the program. At the end of the first year of registration, every student will receive a referral assessment. Students who have not managed to successfully finish at least 75% of the first year are not allowed to renew their registration. This so-called binding referral (BSA in Dutch) is not given if there are causes beyond the control of the student.

SPECIALIZATION

In most programmes, modules seven and eight offer electives within the framework of the program, allowing the student to follow a specific interest. For smaller programmes, it can be difficult to offer this opportunity in the form of a full module. Other options are diversification of parts of a module.

MINOR

The opening semester, core, and specialization are the basis of the program. After these eight modules, students enter the minor semester. The minor is a one semester (=30 EC) timeslot, in which students can add a unique profile to their degree. Students are free to choose from study units offered at the UT or other universities, either abroad or in the Netherlands; do an internship; or opt for a special project of their own design.

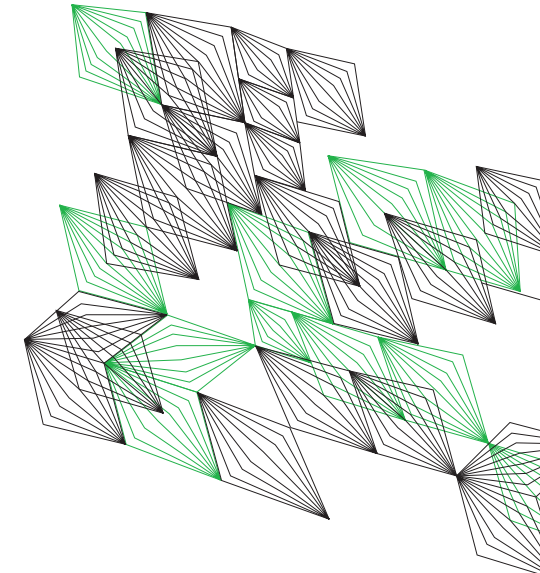
📍 See www.utwente.nl/minor.

GRADUATION SEMESTER

The last half-year of the degree programme is the graduation semester. It is up to the programme to decide whether this semester is organized into two consecutive modules, two parallel modules, or as one large module worth 30 ECTS. A substantial capstone project, that invites students to independently tie together a major part of their programme at a level suited to a bachelor's degree, is part of the graduation semester.

STUDENTS WHO CANNOT STUDY FULLTIME

In a programme that consists of coherent full-time consecutive modules, it is not easy to organize an individual study programme for students who cannot take a full time study load. These are mainly students with specific disabilities, or students who want to combine their programme with a professional sports career. For both categories, the university is committed (partly by law) to offer opportunities. Traditional multiple-course based programmes make it easier to take only part of the study load at a time. TOM asks for more creative solutions.



MORE INFORMATION AND SUPPORT

More in-depth information, guides to designing TOM modules, and personal stories from staff and students about working with TOM can be found at www.utwente.nl/tom.

Designing TOM-modules can be both challenging and rewarding. For support, in the form of advice or training, or to get connected to colleagues who have worked on comparable challenges, you can contact the university's Centre of Expertise in Learning and Teaching (CELT) through www.utwente.nl/celt.

Also, there are some training sessions provided specifically focused on module and project (re) design, which can be found at www.utwente.nl/ctd.

Plus there is a toolbox available for modulecoordinators, which can help you to coordinate your module: www.utwente.nl/celt/toolboxes.



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