

## Study guide Industrial Design : academic year 2017-2018

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# STUDY GUIDE

ACADEMIC YEAR 2017 - 2018

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Department of Industrial Design





Study guide Industrial Design

Academic year 2017 - 2018

Department of Industrial Design

Eindhoven University of Technology

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*All information in this guide is subject to change. Check the TU/e and ID websites and Education and Examination regulations (EER's) for both the Bachelor and Master for up to date and additional information. The authors of this study guide are not responsible for the consequences of incorrect information mentioned in this guide.*

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# PROLOGUE

The Department of Industrial Design at Eindhoven University of Technology enters its seventeenth year of educating students to become societally-aware industrial designers of intelligent systems, products and related services. This study guide, which is partly based on Hummels and Vinke (2009), summarizes the main aspects of the Bachelor and Master programs in Industrial Design at Eindhoven University of Technology. Furthermore, it describes the educational mission and approach, the coherence within and between the learning and how we assure the quality of the education.

In the previous 16 years the department and its education have been through many changes and transformations. I have experienced most of them. Now in its seventeenth year, and after the recent transformations, the Bachelor and Master Program need time to settle. Therefore, when I took on the responsibility as Program Director of Industrial Design I promised to make little changes to the education, in order to make big steps for the department. Instead of these changes, our community of staff and students can now fully focus on inspiration and creativity, strengthening the research within Industrial Design, and extending our reputation and societal impact.

We would like to express our gratitude to all those that contributed to this guide and the online study guide. Their contributions and critical readings are crucial for successful implementation of our educational programs. We hope that this study guide provides a clear overview of what students can expect, and what is expected of them.

On behalf of the Educational Management and Educational Affairs, I wish you an inspiring and creative study experience.

Prof. dr. ir. Stephan Wensveen  
Program Director of Industrial Design



**reddot** award 2017  
winner







1.

# MISSION AND APPROACH

The educational programs of Industrial Design at Eindhoven University of Technology distinguish themselves by their focus on designing intelligent systems, products and related services, and by their emphasis on self-directed and competency-centered learning. With this approach, we aim to offer our students a thorough preparation for a rapidly transforming society, and their challenging role in this society.

## 1.1 MISSION

The educational mission of Eindhoven University of Technology, as formulated by Meijers and Den Brok (2013), is to educate engineers who can make significant and innovative contributions to society throughout their entire professional career. The core elements addressed in this mission highlight:

- Striving for excellence through strong connections between research and education;
- Small-scale education with a master–apprenticeship model as an essential ingredient for academic education;
- An international and diverse student population;
- Demand-driven education with more emphasis on the coaching role of the teacher;
- Digital education tools for large student groups;
- Professionalization of teaching staff;
- Multidisciplinary work;
- Emphasis on output qualifications and quality assurance;
- Substantial involvement of industry;
- Support of lifelong learning.

From discussions with industry, the Department of Industrial Design has made the decision to focus on the creation of intelligent systems, products and related services. Products are increasingly gaining in intelligence, and are often components of larger systems. In these systems, individuals interact with products, individuals interact with other individuals - sometimes through products - and products interact with each other. They have adaptive behavior, context-awareness and highly dynamic interaction. Consequently, the social and societal contexts in which these systems exist are critical. As such, the mission of the department is to

*Create intelligent systems, products and related services in a societal context.*

To achieve our mission, the department brings together experts from five distinct areas of expertise: creativity and aesthetics; technology and realization; user and society; business and entrepreneurship; and math, data and computing. Through both design and research processes, the knowledge and skills from these areas are integrated into innovative concepts. As they develop the competencies that industry and society are seeking, our students play a key role in achieving our mission.

## 1.2 APPROACH

In an active consideration of recent developments in both the professional and educational field, as described below, the Industrial Design programs are based on self-directed and competency-centered learning. Students are considered junior employees as they take responsibility, and participate in achieving the mission of the department. It offers a learning environment that is close to professional reality and prepares students to work in domains that constantly adapt to societal changes.

## 1.3 COMPETENCY-CENTERED LEARNING

Competency-based development is becoming more important in the development of future-proof organizations as it supports employees in acquiring new competencies and increases their responsibility. Therefore, we believe that competency-centered learning will prepare students better for their future career. Competency-centered learning gives equal weight to attitude, skills and knowledge, and stimulates learning by doing. Within our department, a competency is defined as “an individual’s ability to select, acquire, and use the attitude, skills and knowledge that are required for effective behavior in a specific professional, social, or learning context.”

The programs offer a holistic view of design, in which students integrate attitude, skills and knowledge acquired in the different areas of expertise in projects or professional contexts to develop their overall design competence. This learning process is personal and context-dependent. Different contexts or personal preferences require the development of different competencies. As such, students must take responsibility, and individually determine a large portion of their program.

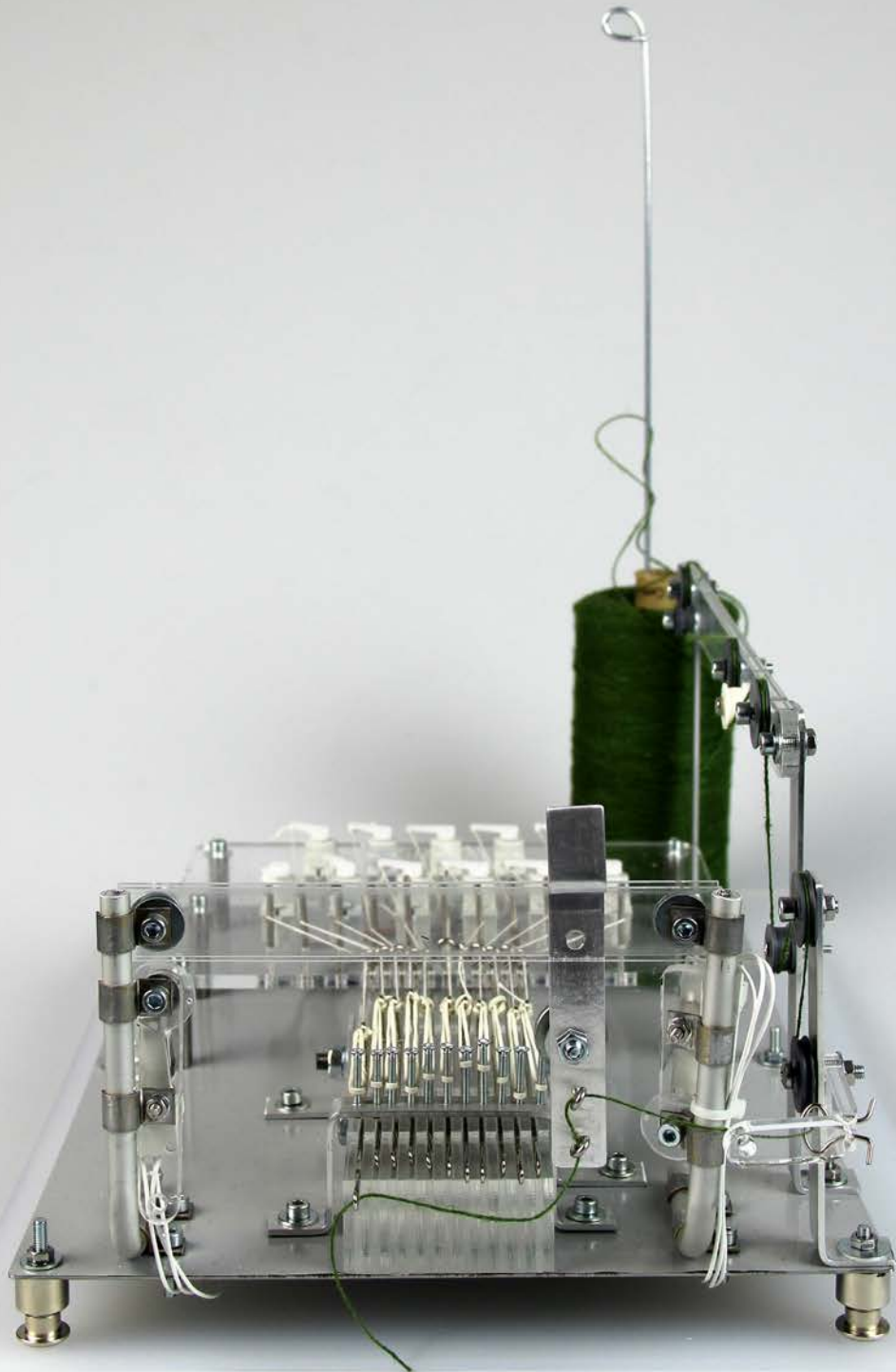
During their educational career at Industrial Design, students go through different stages. They begin as novices in the Bachelor program and focus mainly on interactive systems, products and related services, while they progress towards becoming practitioners. After the Bachelor program, students can specialize in two areas of expertise to become experts. Furthermore, they can choose to focus on research, creation or valorization in the field of industrial design. Therefore, we offer three different tracks: Constructive Design Research; Research, Design and Development; and Design Leadership and Entrepreneurship.

## 1.4 SELF-DIRECTED LEARNING

Society in the 21st century is characterized by rapid changes. Science and technology are developing at a high pace, which turns this era into a “knowledge age.” The amount of knowledge is rapidly increasing and the advances in information and communication technology wildly increase the volume of easily accessible information. Functioning effectively in this rapidly developing society requires the ability to creatively and flexibly deal with large amounts of constantly changing information, and the ability to learn.

In our programs, students increasingly learn to take responsibility for their own learning. This applies to directing and managing their learning process, and determining what kind of designer they want to become. They must choose and plan suitable curricular learning activities and reflect on them to learn continuously. At the end, they must prove that they have achieved an adequate competency development as a professional designer, and that they know how to continue their personal development throughout their professional career.

To plan and direct their learning, students compile a Personal Development Plan, where they describe their learning goals and intended competency development. Furthermore, they indicate which learning activities (e.g. projects or electives) best match their learning goals and required competency development of that semester. All this occurs within the structure and content that the department and university provide, and with the help of senior staff who support and challenge the student’s learning processes.









# 2.

# COMPETENCY FRAMEWORK

Learning starts and ends with a student's professional identity, which consists of personal traits and characteristics. This identity is about how students view themselves as (future) designer. Differences in professional identity will lead to the pursuit of different learning experiences, in which students develop appropriate attitudes, skills and knowledge.



## 2.1 COMPETENCIES

Competencies are developed as a result of integrating learning experiences in which attitude, skills and knowledge from different areas of expertise are selected, acquired, and used. Demonstrations (known as “demos”) are the result of applying competencies in, for example, a project. It is at this level that the performance of a student can be assessed.

Our department uses an adapted competency model (see figure 1) based on the Criteria for Academic Bachelor and Master Curricula, as defined by Meijers et al. (2005). The final aim of our educational programs is to develop an overall competence of design. This overall competence of design combines a vision, professional identity and the individual competencies, which are unique combinations of attitude, skills and knowledge from the different areas of expertise.

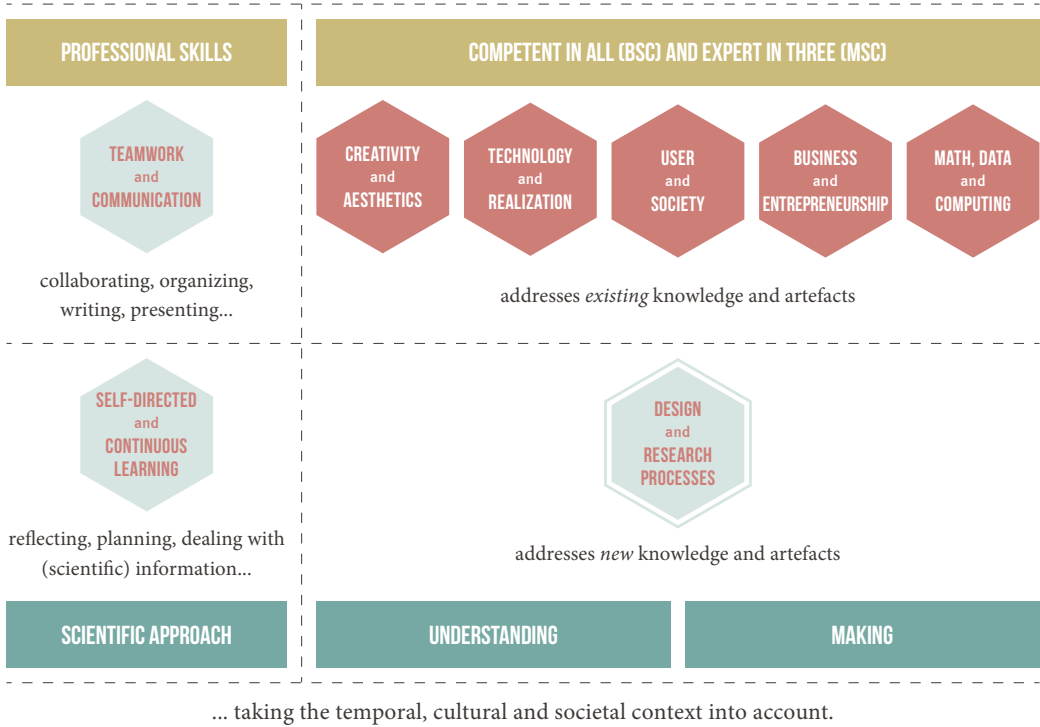
In addition to the competencies required to operate successfully, students must also be competent in designing and researching. This is emphasized in competency Design and Research Processes. Furthermore, students must develop professional skills and a scientific approach, which is demonstrated in their ability to communicate, process and apply scientific information, plan and organize, reflect and collaborate. These professional skills are emphasized in most educational activities, and should also be explicitly addressed in their Personal Development Plan (also known as the PDP).

## 2.2 PROFESSIONAL IDENTITY

The professional identity is who students are as a designer. It is a product of their personality traits, personal history and what drives and inspires them, their interests, norms and values, beliefs and competency profile. It describes the role they typically assume in a design process, and their strengths and weaknesses as a designer. The professional identity is in constant development as students must continuously reflect on their desired professional identity. The desired professional identity describes who they want to be as a designer, and is constructed by placing their current professional identity in the context of their vision on the future role of the designer. As such, the professional identity is built on past experiences, expresses how they currently view themselves, and states who they would like to become.

# OVERALL COMPETENCE OF THE TUE INDUSTRIAL DESIGN ENGINEER

Self-directed and continuously developing a (professional) identity guided by a personal vision...



- Examined in Projects
- Examined in Courses

Figure 1. Competency Framework, adapted from Meijers et al. (2005)

## 2.3 VISION

A vision is an inspiring and coherent set of ideas and beliefs about the future of society, emergent technologies and the future role of academic designers or design researchers in shaping that relationship. A vision has a long-term perspective and indicates how something will be, should be or can be interpreted. It is based on personal drives and needs, and influences actions and decision-making. Consequently, it directs professional identity development and gives meaning to learning. A vision covers the principles, values and norms that are important to an individual or organization. From a vision, one should be able to deduce the competencies that must be developed. Consequently, a vision should have a clear focus to serve as a point of reference and should be connected to the professional identity.

## 2.4 AREAS OF EXPERTISE

The areas of expertise broadly concern the diverse academic domains (within the arts and humanities, and the social, natural and formal sciences) that are directly linked to the discipline of industrial design. They include disciplinary knowledge, skills and attitudes, as well as theories, methods and techniques that are customary in these fields. Furthermore, they comprise the relations between this field and other disciplines.

### *Creativity and Aesthetics (CA)*

Design is the breaking free from the world as we know it. To achieve change, designers are creative and inquisitive as the act of designing is a constant process of dealing with a lack of information. They can generate, select and refine ideas by using a variety of creativity techniques and by changing perspectives. Designers make use of physical and interactive materiality and have a critical attitude towards their aesthetic quality (good for the sake of good), demonstrated in quality of form, interaction, etc. They trust their senses and find a balance between intuition and knowledge-driven design. They position themselves in and are inspired by (art) historic benchmarks. They conduct iterative analyses of doing while reflecting on action, which they illustrate through design narratives.

### ***Technology and Realization (TR)***

Design is about exploring, visualizing, creating and demonstrating innovative concepts and experiences using appropriate technologies. To design interactive systems and building prototypes, designers choose and integrate appropriate sensors and actuators, use object-oriented design, algorithms, circuits and mechanisms. They can communicate with engineers from different disciplines (e.g. Electrical Engineering, Computer Science, Mechanical Engineering) and understand their scientific writings. They can read specifications and datasheets, and they can document hardware and software conscientiously. They can make informed judgements through calculations and appropriate mathematical tools to demonstrate the technical and economic feasibility of their designs. They have an awareness of data science and artificial intelligence.

### ***User and Society (US)***

Design is about creating value for people and directly impacts everyday life. To have a (positive) effect on the user experience, designers have basic awareness of psychology (perception, emotion and cognition) and sociology. Designers are sensitive and respectful (ethical and moral), can empathize with people and involve them as main stakeholders in the design process. They ask the right questions, and use quantitative and qualitative research methods to collect insights and evaluate or validate concepts. They switch perspectives throughout the design process to learn from and understand people in their societal context. They are open to different mind-sets and have a sensibility for social, political and cultural implications of design. They can position design in a historical, societal and cultural context, and can identify, challenge and shape societal and cultural trends.

### ***Business and Entrepreneurship (BE)***

Design is about creating meaningful product-service systems that create value for people and the economy. To create new value propositions, designers develop business cases, using market trends and competition analysis. They validate business cases, through real-life testing. They understand economic and financial models addressing manufacturing, sales, service, use and re-use. They create sustainable business networks and are familiar with basic business principles concerning entrepreneurship, intellectual property rights, and business ethics. They have an understanding of organizations and can manage processes involving multiple stakeholders. They can position design in a company and macro-economic context; identify and challenge macro-economic trends and shape micro-economic processes.

### ***Math, Data and Computing (MDC)***

Design is about dealing with complex and often, in an academic sense, messy realities. To get a grip on such complexity, designers analyze, structure, simulate, and validate solutions using data analysis and models. They have a well-established base in mathematics, data analytics and logic, and identify and communicate important aspects of their design using data representations and models. They can achieve observations across individuals, time or space and can identify emerging patterns (in large data-sets) using statistical methods. They identify measurable variables that serve as input for an adequate, sufficiently simple and precise model and define if the transformed variables produce relevant, reliable and accurate output variables that satisfy the requirements of the designed application. They implement data structures and algorithms into designed products and services using data processing and computing.

### ***Design and Research Processes (DRP)***

Design is about using, grasping, adapting and inventing design and research processes based on the demands of the task at hand. To act efficiently and effectively, designers choose and adapt appropriate methodologies for their challenge. They do research that directly feeds into their design and perform research that generates knowledge for the design and research community. They manage and lead processes identifying creative, focused, and manageable topics that address potentially significant yet previously less explored aspects. They synthesize in-depth information from relevant sources to critically frame the design research approach from various angles and perspectives through reflection. They consciously switch between subjectivity and objectivity; implicit and explicit knowledge; making and thinking; intuition and reason; perception and cognition. They do this based upon, and contributing to the existing repository of academic knowledge.

## **2.5 PROFESSIONAL SKILLS**

Engineers are not just technical specialists, but have a prominent role as decision makers and consultants. To better prepare students for their professional career, students have to be aware of the professional context in which they operate and its actors. This does not only require disciplinary knowledge, but also a set of professional skills, namely: communicating, collaborating, planning and organizing, dealing with (scientific) information and reflecting.

### ***Communicating***

Designing requires extensive communication with various stakeholders (team members, users, clients, research community etc.). To show results at the end or along a design or research process, designers communicate orally, in writing (reports or scientific papers) or using sketches, prototypes, videos etc. They choose the appropriate methods and media depending on the purpose of the message, situation and audience. They motivate decisions as well as considered alternatives and have a personal and attractive (visual) design identity. Finally, designers should also be able to clearly communicate their own professional identity and vision.

### ***Collaborating***

Designing involves working with many different stakeholders and experts. Designers play a leading role in the assimilation and integration of all the different parts of a project. Projects oftentimes involve multidisciplinary and international teams and designers should be able to communicate well with all its members. They have to create a constructive atmosphere in a group, share ideas and assure that the team efforts surpass individual contributions. They can manage a project or, depending on the situation, take a different role in a team.

### ***Planning and Organizing***

Designing involves complex processes and projects are generally time-restricted. Consequently, designers organize, plan and manage processes and undertake action and re-direct their process when necessary to achieve the best results. In addition to projects, designers should also plan and organize their learning as the domain in which they operate is in continuous development. They have a preferred learning style and strategy and can continuously define what they need to learn. They can set goals, choose suitable activities, and can self-assess their development.

### ***Dealing with Scientific Information***

Designing builds on and uses inspiration from others. Designers search in available repositories of (academic) knowledge for appropriate information and compare sources to assess their value. They have a critical attitude and are able to build an argument based on different perspectives. They combine information from different sources to create innovative propositions or visions, that contribute to repositories of (academic) knowledge. They indicate what sources inspired

them and position their work in a specific academic domain. Hereby, they use the appropriate referencing standards.

### ***Reflecting***

Designing in the 21st century requires continuous adaptation to societal and technological developments and situational changes. Designers use reflection to learn from experiences and to give new meaning to what they already know or understand. They use reflection to plan (reflection before action), to monitor and redirect (reflection in action) and to improve (reflection after action). They reflect verbally and in writing and formulate broad, deep and critical reflections supported by sufficiently detailed evidence. Reflections are coherent and consistent and lead to new learning intentions.











# 3.

## BACHELOR PROGRAM

The goal of the Bachelor program is to support students in becoming a practitioner capable of designing interactive systems, products and related services in a societal context. The first year focuses on building an awareness of the areas of expertise related to the field of industrial design. In the second year, students learn various design and research approaches, and expand their attitude, skills and knowledge within the expertise areas. The third year is dedicated to strengthening the student's professional identity and vision, and demonstrating the overall competence of designing through an individual final design project.

## 3.1 BACHELOR COLLEGE

The Industrial Design Bachelor program is part of the Eindhoven University of Technology Bachelor College, and is comprised of the Major, basic courses, free electives and a USE course sequence (see figure 2). The Major determines the field in which a student intends to work as an engineer. The compulsory Basic Courses are generic engineering courses that provide a solid foundation that enable the engineering career to take different directions. In addition to the Major, an important part of the study comprises free electives that can accentuate a study. Students are supported by a teacher coach throughout the entire program.

## 3.2 GOALS AND CURRICULUM

The first year of the Bachelor program determines whether students are potential industrial designers of interactive systems, products and related services in a societal context. They must demonstrate sufficient responsibility to be self-directed learners, and demonstrate sufficient awareness of how to continue developing their overall competence of designing within the competency framework. At the end of the first year students have built awareness regarding their overall competence of designing. At this level they are able to identify, select and apply knowledge and skills from the different areas of expertise in a design project. In the second year, students have more opportunities to develop their professional identity and vision. They will gain more depth in particular areas of expertise, and must have a clearer vision of the direction they wish to take as a designer. If their development is on track, students can test their vision outside of the department in the first semester of the third year through an internship, exchange or minor. Finally, during their Final Bachelor Project, students demonstrate their capability to independently conduct a design project with minor guidance. Figure 2 shows an overview of the learning activities for each year and quartile.

	QUARTILE 1	QUARTILE 2	QUARTILE 3	QUARTILE 4
<b>BACHELOR YEAR 1</b> 2017 – 2018	DCB100 From Idea to Design	DDB200 User-centred Design	DPB100 Project 1 Design	
	DBB100 Creative Programming	Elective Course	DBB200 Creative Electronics	Elective Course
	2WAB0 Calculus	3NAB0 Applied Physics	2IAB0 Data Analytics for Engineers	0SAB0 USE Basics
	QUARTILE 1	QUARTILE 2	QUARTILE 3	QUARTILE 4
<b>BACHELOR YEAR 2</b> 2018 – 2019	DPB210 Project 2 Design		DPB220 Project 3 Design Research	
	USE Elective	DDB100 Design < > Research	DCB200 Aesthetics of Interaction	DAB100 Making Sense of Sensors
	4WBB0 Engineering Design	USE Course	USE Elective	USE Elective
	QUARTILE 1	QUARTILE 2	QUARTILE 3	QUARTILE 4
<b>BACHELOR YEAR 3</b> 2019 – 2020	External Learning Activity Internship / Exchange / Minor / Electives		DPB390 Final Bachelor Project	
		DPB380 Professional Identity and Vision	DAB200 Design Innovation Methods	Elective Course

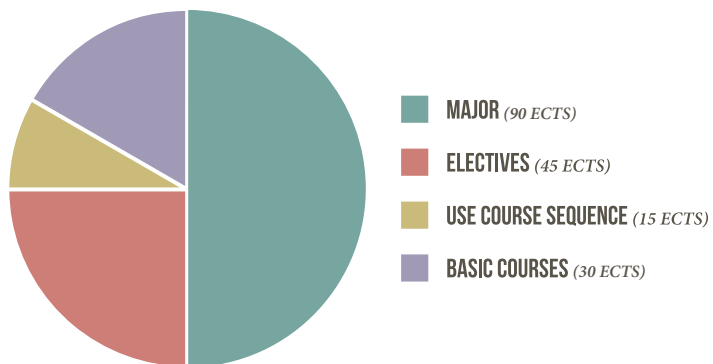


Figure 2. Overview of the Bachelor Program

## 3.3 MAJOR

The Bachelor program consists largely of the Major. The Major is the field in which students want to work as an engineer, and forms the basis of their education. At the Department of Industrial Design, the Major is composed of nine core design courses and four projects.

### *Core Design Courses*

The core design courses of the Bachelor program form the basis of the Eindhoven Industrial Design Engineer and are coupled to the eight core chairs of the department. Within the core courses, students develop a knowledge and skill base, which they can use and further develop in projects.

- From Idea to Design (CA)
- Creative Programming (TR)
- User-Centred Design (US)
- Creative Electronics (TR)
- Design <> Research (DRP)
- Aesthetics of Interaction (CA)
- Making Sense of Sensors (MDC)
- Design Innovation Methods (BE)

### *Projects*

Projects form the backbone of the Industrial Design program. Through projects, students integrate (select, use and sometimes acquire) the attitude, skills and knowledge from different areas of expertise, they learn design and research processes, and they develop their professional skills. Projects are open challenges, and support developing the overall competence of designing in an authentic professional context, as they involve a variety of stakeholders. Furthermore, projects offer a ground to explore interests, and to develop a vision and professional identity. We offer design and design research projects, which are first conducted in a team, and finally individually. Students can further self-direct their learning by choosing from a diverse offer of projects, in so-called “squads.” Squads are teams of academic staff members, experts from practice, PhD candidates, USI trainees, and Master and Bachelor students working within a specific application domain. The projects have a strong connection to ongoing research in the department, and often have an external client.

- Design Project 1 (Team)
- Design Project 2 (Team)
- Design Research Project 3 (Team)
- Final Bachelor Project (Individual)

## 3.4 BASIC COURSES

All Bachelor students of Eindhoven University of Technology must complete five generic engineering courses, also referred to as Basic Courses, and develop their professional skills. The generic engineering courses and professional skills provide the foundation for the Eindhoven Engineer, and support the acquisition of transversal knowledge, which is needed to take electives and coherent elective packages outside the Major. In addition to the basic courses, there is the course “Professional Identity and Vision,” where students must reflect on and present how they have developed their professional identity and vision throughout the Bachelor program (see page 16 and 18). This course helps them to define the direction and learning goals for their Final Bachelor Project. The generic engineering courses relate to and support development in the different areas of expertise:

- Calculus (MDC)
- Applied Physics (TR)
- Data Analytics for Engineers (MDC)
- USE Basics (USE)
- Engineering Design (DRP)
- Professional Identity and Vision (PI&V)

### *USE Course Sequence*

As part of the elective space, students must select at least one USE course sequence, or the program Science, Education and Communication. USE stands for the User, Society and Enterprise perspective of an engineer, and USE course sequences demonstrate that technology is always used in a larger context. Engineers develop technology for users, to solve societal problems and to create economical possibilities. Each USE course sequence revolves around one main subject, which makes the interaction between technology and the surrounding environment clearly visible and focuses on one or more USE perspectives. USE course sequences provide a great opportunity to deepen the professional identity and vision.

## 3.5 ELECTIVES

At the Department of Industrial Design, electives form the connection between the knowledge and skill base developed in the core and generic engineering courses and practice, projects and professional domain. They offer students a controlled context to develop their overall competence of designing. In addition to the electives offered by the department, students may also take electives at other departments. Students should choose the electives that best match their learning goals and contribute most to their intended development, as derived from their professional identity and vision, as described in their Personal Development Plan. If they choose more than three courses from other departments (with the exception of the USE course sequence described above), they must request formal approval from the Board of Examiners. The teacher coach can support students in the process of decision-making. In some cases, electives are offered as coherent course sequences of two or three electives, such as the USE course sequences. Choosing electives can support expanding the overall competence of designing.

A special opportunity is offered in the third year to students whose development is on track. In the first semester of the third year, students may replace a maximum of five electives with an internship, exchange or minor to confront their professional identity and vision with an external context. The plans for an external learning activity must be discussed, and formally approved by the teacher coach in the second year. The intended development during an external learning activity should contribute to a sufficiently balanced development within all areas of expertise at the end of the Bachelor program. If serious doubts emerge about the contribution of an external learning activity to the end terms of the program, students must submit a formal request to the Board of Examiners.

### *Internship*

One of the possible external learning activities is an internship. An internship provides students with the opportunity to experience a professional design or design research context, and to develop specific knowledge and skills that are not offered by our educational program. Internships can be conducted at a company within the Netherlands or abroad that guarantees a good learning environment. Furthermore, the general aims of an internship must match the development within the competency framework. Students may also conduct a research internship within the department, for which they must contact a member of one of the department's chairs. The teacher coach must give formal approval, and assesses whether the students has achieved the pre-defined learning goals during the internship.

## *Exchange*

The second possible external learning activity is an exchange, in which students take courses at a university abroad. We collaborate with many industrial design and related programs around the world, and each program has a specific focus and expertise within the broad domain of industrial design. Consequently, an exchange provides the opportunity to gain knowledge and skills related to the areas of expertise that are not offered by our educational program. Furthermore, exchange programs are an excellent opportunity to gain experience in operating in an international context. If we have a bilateral agreement with the host university, students are not required to pay tuition fees when they participate in their program. For specific projects with partner universities, contact needs to be initiated through individual coaches.

## *(Free-)minor*

Finally, students can do a (free-)minor at another university in the Netherlands as external learning activity. A (free-)minor supports in deepening the knowledge and skills in a specific academic domain (e.g. philosophy, psychology or business administration). With the exception of minors offered by our partner institutes at Delft University of Technology and University of Twente, students must be able to make a clear connection to the domain of industrial design. Therefore, students must provide a clear argumentation of why a proposal agrees with the student's objectives for competency development in a request to the Board of Examiners.

## **3.6 ADDITIONAL LEARNING ACTIVITIES**

Both within and outside the curriculum, additional learning activities are offered that contribute to the overall competence of designing. These learning activities can be a (mandatory) part of projects, such as professional or practical skills workshops, which offer an opportunity to deepen knowledge and skills; an honors program; or certain extra-curricular activities that may serve to demonstrate excellence.

## *Workshops*

Workshops are relatively short learning activities of various size, which provide an introduction to a variety of topics. In addition to workshops related to professional skills (e.g. information brokering, reflecting, presenting and group dynamics), the Department offers various workshops on topics such as academic writing, creating a showcase or physical modeling. Some workshops are meant to initiate and support general competency development, while others provide specific expertise linked to a particular expertise area of an application domain, through e.g. a



squad. In addition to the workshops offered by teaching staff, study association Lucid also offers workshops on practical skills such as graphic design or website development. Furthermore, students can join a variety of courses offered by the Education and Student Affairs (ESA). These courses support in improving study skills, making the right study choice, communicating in intercultural settings, and developing social and communicative skills. Furthermore, ESA offers different language courses for example to improve the level of English.

### ***Honors Program***

On top of their regular program, the 100 best students of the University can participate in an Honors program. By the end of their first year, nominal students are invited to apply for the Honors program, which has a 30 credits additional workload. Students can choose a track, which challenges their development. The Honors program enables them to work together with students from other departments, to meet inspiring coaches, to explore the forefront of knowledge and to meet with people from industry. Through the Honors program students can either dive into their own discipline or explore other disciplines.

### ***Extra-curricular Learning Activities***

As we want to be the best Industrial Design department in the world, we also challenge our students to strive for excellence. Excellence can be demonstrated in various ways, but it is mostly about leaving a highly positive impression. Students can demonstrate excellence through a steep curve in their development or by delivering an impressive design or prototype. Perfectly combining various activities that contribute to their development as a designer such as setting up a successful start-up relating to one of their designs or running a successful crowd-sourcing campaign for one of their ideas contribute to excellence. Finally, excellent students can also participate in the TU/e Honors Academy, as described above. For excellence to be evident, it is important that their work is recognized externally. This is one of the admission requirements to apply for Cum Laude, which is awarded to the top 5% of our graduates.

The Department stimulates students to participate in exhibitions, awards and conferences. Participation provides students with an excellent contribution to expand their curriculum and often opens up opportunities to connect to possible employers. Winning an award will make their curriculum stand out when competing for a job. Furthermore, participating in these venues

increases the visibility of the Department in various rankings. This stimulates the attraction of students, experts and clients, thereby improving the quality of education.

Students are encouraged to visit exhibitions, museums and events, to get a better understanding of how to position themselves in the field of Industrial Design. Consequently, they should attempt to get their work presented in these exhibitions. The demo days are organized for students to show and demonstrate their projects. Demo days are open to the public and provide students an excellent opportunity to communicate their project and design process to a broader audience and ask specific feedback from various experts. At the same time these days provide coaches with the opportunity to “benchmark” their students’ projects, by comparing them to projects performed by other students. Every year the best student projects will be selected by project coaches to represent our Department in exhibitions or competitions.

With respect to awards and conferences, the Department decided to focus its efforts on a subset to increase impact. We encourage and financially support students to participate in the awards and conferences indicated below as they are closely connected to our ambitions. Students can apply by submitting a research paper or they can participate in the offered competitions. Financial support is provided upon acceptance.

### **Exhibitions**

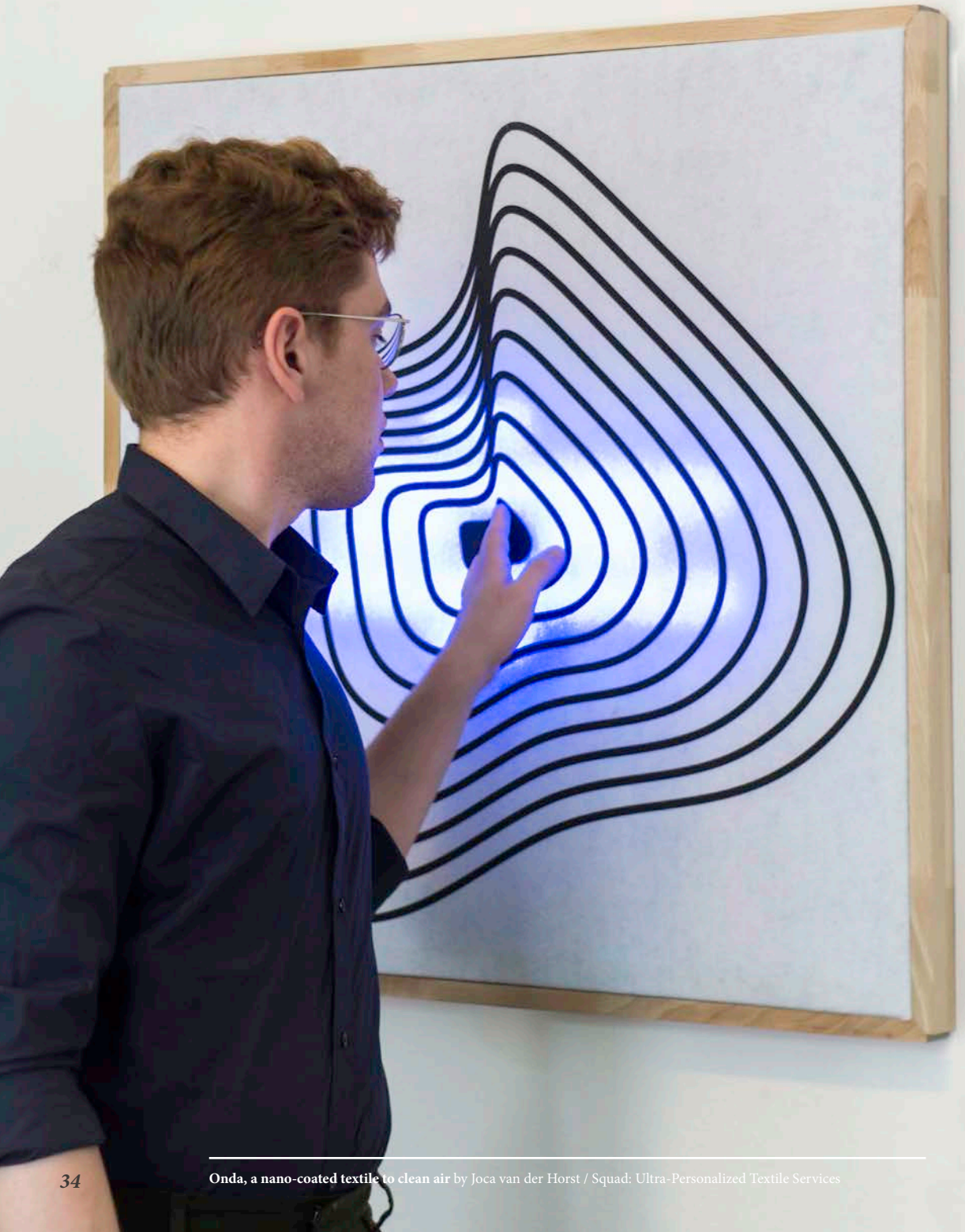
- Dutch Design Week
- Milano Design Week
- Dubai Design Week

### **Design Awards**

- Red Dot Award: Design Concept
- iF student design award
- Interaction Awards (IxDA)

### **Conferences**

- ACM Conference on Human Factors in Computing Systems (CHI)
- ACM Conference on Tangible, Embedded and Embodied Interaction (TEI)
- ACM Conference on Designing Interactive Systems (DIS)



## 3.7 TEACHER COACH

Our program offers demand-driven education with many opportunities for individual choices. Doing so, we try to recognize individual differences between students' interests, learning needs and learning styles. We expect students to actively explore the industrial design engineer they want to become and to develop a firm and realistic impression of the field of design. We want students to develop a clear professional identity, vision on the profession and on the future design practice and use it as a starting point for consciously arranging a personal learning path.

Teacher coaching is a form of coaching that supports students' professional identity and vision development. Furthermore, teacher coaching contributes to the students' employability perspective, self-directedness and overall competence of designing. In the first year of the program, master students fulfill the role of the teacher coach as a tutor. These master students can help the first year student to get used to the academic environment, to introduce them to their network and to find their way in our department. In the second and third year, teacher coach meetings with staff members are regularly scheduled throughout the program. The meetings are intended to monitor and formatively assess the students' self-assessment pertaining to their professional identity, vision, ability to learn self-directed and continuously and overall competence of designing. In meetings the teacher coach provides verbal feedback on where students are in terms of professional identity, vision, ability to learn self-directed and continuously and overall competence of designing as well as on the students' future (personal development) plans.

### ***Professional Identity and Vision***

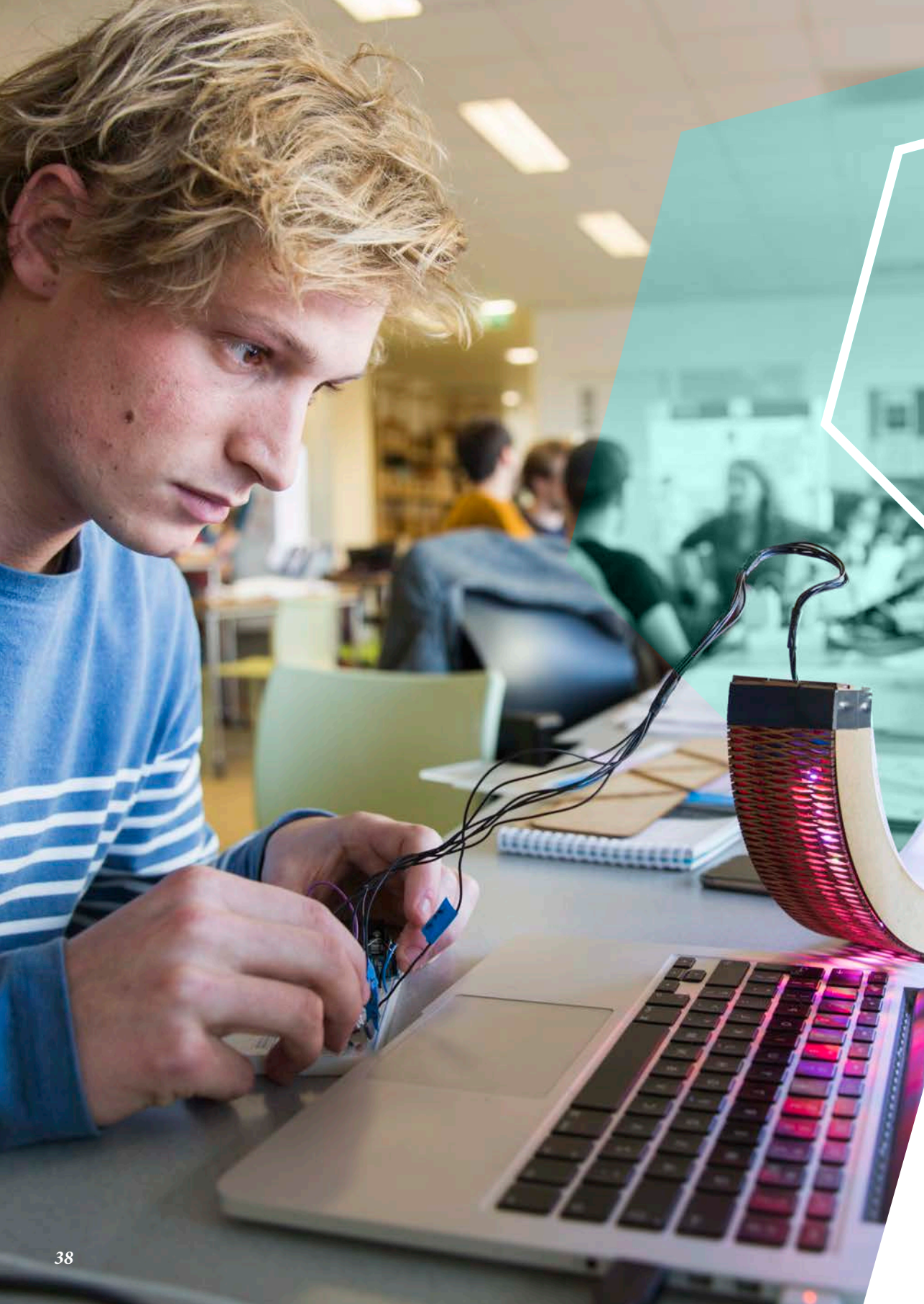
Students have to individually regulate their professional identity, vision and overall competence of designing throughout the whole Bachelor program. Tutors and teacher coaches monitor where students are, and where they want to go. They provide verbal feedback during meetings, which students have to summarize and use as input for follow-up meetings. Students are responsible to contact their teacher coach and to come well prepared to the meeting. Students should proactively look for information and should not expect that their teacher coach has insight in all development possibilities.

To support in their preparation, we offer a blended learning line on “Professional Identity and Vision.” The digital element of the learning line is comprised of a series of modules offered via a platform. These modules offer students the basis to learn about self-directed and continuous learning and provide the necessary knowledge and skills for personal development. Teacher coaching is considered as the face-to-face element of this learning approach.

We expect and stimulate students to work on their portfolio, which includes reflections and evidence from the most relevant learning activities. In this portfolio, students describe their professional identity, vision as well as their overall competence of designing. They do this by describing past experiences, reflecting on present learning activities, and by planning future learning activities in the context of the competency framework. The portfolio is assessed at three instances throughout the Bachelor program.









# 4.

# MASTER PROGRAM

The goal of the Master program is to support students in becoming an expert within a specific field related to the design of intelligent systems, products and related services in a societal context. Throughout the Master, students develop a professional identity, with a clearly defined competency profile resulting from the integration of their selected areas of expertise, driven by a unique and personal vision on designing. In the first year students define where they intend to achieve expertise. The second year is mainly about demonstrating the overall competence of designing in an individual final design project, and about defining the career track they wish to pursue, as a researcher, developer or entrepreneur.

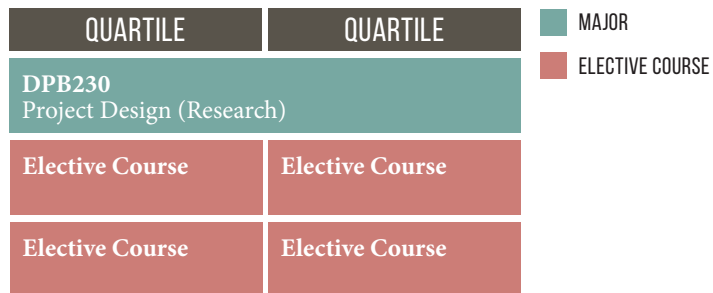


## 4.1 GRADUATE SCHOOL

The graduate program of Industrial Design is part of the Eindhoven University of Technology Graduate School. It consists of the Master program which can be followed-up by the Technological Designer program: User System Interaction (USI) and the PhD program. Graduates considering a career in industry or business can apply for the 4TU.School for Technological Design, Stan Ackermans Institute, a two-year program for technology designer trainees. Furthermore, the Master title provides a sound basis to specialize in the academic field of design. Graduates can become a specialist or kick-start their scientific career by obtaining a doctorate (PhD). A doctoral study lasts four years. Both USI trainees and doctoral candidates are employed by Eindhoven University of Technology.

## 4.2 PRE-MASTER PROGRAM

Students following a pre-master program to be admitted to the Master program participate in the Bachelor program (see page 25). They work with fellow pre-master students on a project and participate in four courses. The Departmental Admission Board advises on which courses to choose to strengthen the development in areas in which the student has deficiencies. In some cases, students can be admitted directly to the Master Program, but they have to take a maximum of three Bachelor courses as part of their elective space to deal with deficiencies. Figure 3 shows an overview of the different learning activities within the Pre-Master.



## 4.3 GOALS AND CURRICULUM

The first year focuses on developing an insight into the academic field of Industrial Design and on defining the areas and application domains in which students want to achieve expertise. Furthermore, students need to clarify what type of professional they want to become by choosing a specific track (see page 44). In the second year students develop towards a clear competency profile. At the end of the Master they have reached a level of expertise. This implies in-depth attitude, skills and knowledge in all five areas of expertise and expertise in at least two areas. Furthermore, they are driven by a unique and personal vision on design and they can independently use, select and acquire relevant attitude, skills and knowledge while designing and doing design research. Figure 4 shows an overview of the different learning activities per year and per quartile.

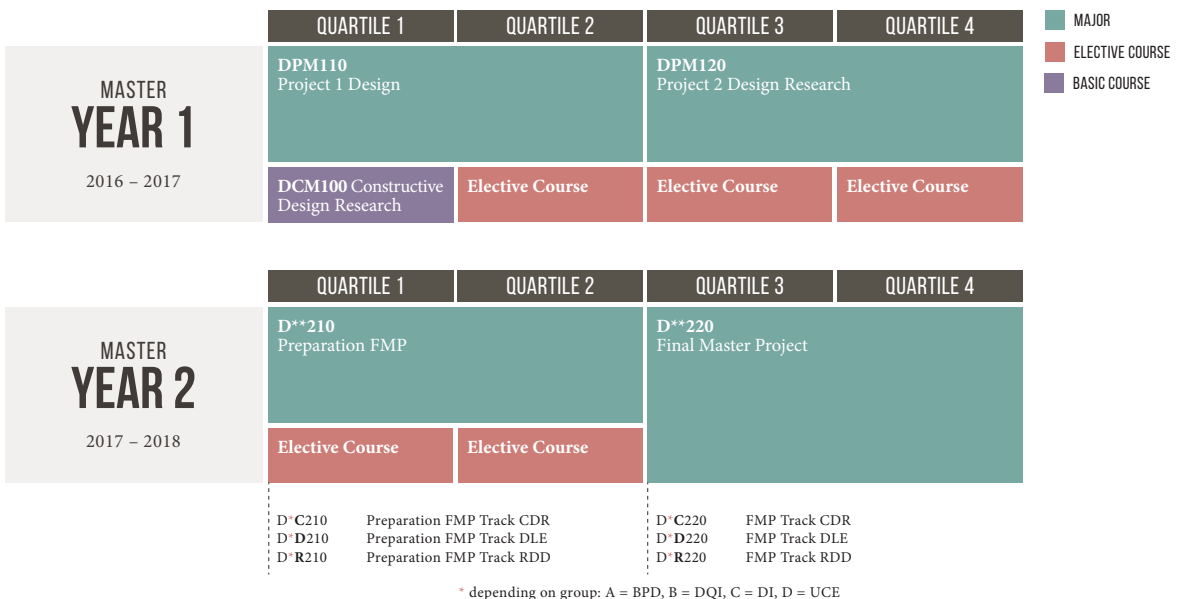


Figure 4. Overview of the Master program

## 4.4 MASTER

The Master program is entirely about gaining expertise and becoming a self-directed learner. It consists of one compulsory course (Constructive Design Research) and three projects. In addition, students have to complete at least five electives. There is a possibility to gain international experience, which we encourage.

### *Constructive Design Research*

In the first quartile, all Master students participate in the core course “Constructive Design Research.” In this course students are introduced to the theories and work with three design research traditions that cover methodological directions in current leading research communities: the lab, the field, and the showroom. Students will be split into three groups where each group works on the same topic but along the lines of one particular design research approach (lab, field or showroom), in order to compare qualities of artefacts produced and knowledge developed.

### *Projects*

Projects form the backbone of the Industrial Design program. Within projects students integrate (select, use and acquire) the attitude, skills and knowledge from different areas of expertise, they learn about Design and Research Processes, and they apply their Professional Skills in an open context. Projects are open challenges, and support developing the overall competence of designing in an authentic professional context, as they involve a variety of stakeholders. Furthermore, projects offer a ground to explore interests, and to develop a vision and professional identity. We offer design and design research projects, which are first conducted in a team and finally individually.

- Design Project (Team)
- Design Research Project (Individual)
- Preparation for Final Master Project (Individual)
- Final Master Project (Individual)

For their Design Project, students can choose from a diverse offer of projects, in so-called squads. Squads are teams of academic staff members, experts from practice, PhD candidates, Master and Bachelor students working within a specific application domain. After choosing their intended

expertise development, students choose a staff member who will guide them in this process as a mentor. Consequently, their work becomes more individual. Students will continue to be associated to a squad, but their projects will have a strong connection to the research interests of their mentor, the external client for which they work or their (intended) start-up.

### ***Professional Skills***

Within the first month of their Master program students have to take the Diagnostic Test for Professional Skills. The test is compulsory for all Eindhoven University of Technology master students and comprises four aspects: a broad skills test and three in-depth tests on teamwork, presentation and academic writing. Students can use the results of this test to define dedicated learning goals in their Personal Development Plan, which they should discuss with their mentor during the introductory meeting. To support the development of their professional skills students can make use of the SkillsLab platform and the Eindhoven University of Technology CareerCentre.

## **4.5 ELECTIVES**

At Industrial Design, electives form the connection between the knowledge and skill base and practice. They offer students a controlled context to develop their overall competence of designing. In addition to the electives offered by Industrial Design, students can also take electives at other departments. Students should choose the electives that best match their learning goals and that contribute most to their intended development, as derived from their professional identity and vision. The mentor supports students in the process of decision-making. Choosing electives supports the development of an expertise profile and the career track students wish to pursue.

## **4.6 INTERNATIONAL EXPERIENCE**

With increasing globalization, international experience is highly advisable for the engineers of the future. Therefore, Master students who have not been abroad during their Bachelor program and have not done their Bachelor studies outside of the Netherlands are strongly encouraged to spend a minimum of 10 weeks abroad. Students can enroll in a suitable course program or join a research group at a foreign institute as part of their Design Research Project. Furthermore, they can carry out (part of) their Final Master Project in a foreign research lab or company. When going abroad as part of their Master program, students will receive dispensation for one elective.

## 4.7 ADDITIONAL LEARNING ACTIVITIES

Both within and outside the curriculum additional learning activities are offered that contribute to the overall competence of designing. These learning activities can be a part of:

- Projects, such as professional or practical skills workshops, which offer an opportunity to deepen knowledge and skills;
- An Honors program; or
- Certain extra-curricular activities, which may serve to demonstrate excellence.

We challenge our students to strive for excellence as it is one of the admission requirements to apply for Cum Laude, which is awarded to the top 5% of our graduates. See page 31 for an overview of activities that can contribute to achieving excellence

### *Honors Program*

The Graduate School offers an honors program for excellent Master students. By joining the Honors Academy students get the chance to explore and enhance their personal leadership skills in a professional context. They can opt for a focus on “excellence for science”, “excellence for society” or “excellence for industry.” The Honors program has a minimum workload of 20 credits on top of the regular program. It consists of two interrelated components: personal leadership development and professional development, which to a large extent can be geared towards personal ambitions, drives and interests.

## 4.8 MASTER TRACKS

A Master track defines the type of professional that a student wants to become after graduation. The outcomes and goals of the Final Master Project vary per track, and students can choose from a subset of electives that support each track. Master students have to choose a track at the end of the first semester.

### *Constructive Design Research (CDR)*

The goal of the Master track “Constructive Design Research” is to support specialization in the attitude, skills and knowledge that are needed to contribute to the design research community by further developing the knowledge domain of interaction design through the act of research. Therefore, students develop in Research-through-Design, which consists foremost of the rather unique combination of high quality prototyping skills, knowledge of theory and theory-inspired

design and an attitude of independent thinking and doing. The main outcomes are research prototypes and the theoretical frameworks that describe and explain them. This combination informs and inspires the future of technology design in society.

The final master project should be conducted within one of the chairs of the department and must result in the submission of a scientific publication and/or a PhD proposal. The track prepares you to continue as a PhD candidate in a design research setting. After the PhD you can pursue a career in academia at both national or international universities. However, a PhD may also lead to a start-up or a directing position in companies such as BMW, Philips, Microsoft or TomTom.

### ***Research, Design and Development (RDD)***

The goal of the Master track “Research, Design and Development” is to support specialization in the attitude, skills and knowledge that are needed to contribute to succeed in the research and development or design department of a corporation or public institution. Therefore, students develop in a specific domain where the company or institution they wish to work for operates. In addition to their ability to design and realize interactive systems through a user-centered process, they need to develop design management skills and business awareness as graduates are expected to be able to operate in the business context.

Graduates apply various design approaches and go through them at a fast pace. The final master project should be conducted for, or within a corporation (e.g. Philips, TomTom, BMW, Océ or Nedap) or (semi-)public institutions and must be presented in a report that shows both academic development and relevance for the company. After the RDD track, graduates can continue in industry or continue developing their competencies relating to user-centered design methodologies by applying to the User-System Interaction Program, a two-year program that awards the academic degree Professional Doctorate in Engineering (PDEng).

### ***Design Leadership and Entrepreneurship (DLE)***

The goal of the Master track “Design Leadership and Entrepreneurship” is to support the development of future professional design leaders and design entrepreneurs for the rapidly developing Creative Industries sector where creativity and innovation play a central role. Students will be supported to develop their career with real-life case studies and guest lectures from the creative industries. Therefore, students develop to support the creation of strategic

value of (technology advanced) design in creating (societal relevant) innovations. Furthermore, they learn how design and design thinking can help creating and managing (technology) entrepreneurial innovations and they learn how to make real impact for companies, users and markets in societal contexts from the perspective of creative industries.

The final master project should include a business plan or an effective crowdsourcing campaign, which clearly states the market students are targeting, what the business model will be and which technology is needed. After the program graduates can join a company in the creative industries such as VanBerlo or Studio Roosegaarde, or setup their own design studio or start-up. Consider innovative start-ups from our alumni such as Hugsy, 3D Hubs and Smart Goals, or successful design studios such as Unit 040 and Afdeling Buitengewone Zaken.

## 4.9 MENTOR

The mentor supports students in choosing electives and projects, creating a Personal Development Plan, developing a professional identity and vision, and with reflection. After the first semester, students can choose a graduation mentor who will guide them through the rest of their Master. Consequently, the mentor supervises and is part of the assessment team of the individual Master projects. Students become part of the squad of their mentor.

### *Professional Identity and Vision*

Students have to individually regulate their professional identity, vision and overall competence of designing throughout the whole Master program. Mentors monitor where students are and want to go, and provide verbal feedback during meetings, which students have to summarize and use as input for follow-up meetings. Students are responsible to contact their mentors and to come well-prepared to the meeting. Students should pro-actively look for information and should not expect that their mentor has insight in all development possibilities.

In dedicated weeks (9 and 10 of each quartile), students work on their portfolio, which includes reflections and evidence from the most relevant learning activities. In this portfolio, students describe their professional identity, vision as well as their overall competence of designing. They do this by describing past experiences, reflecting on present learning activities, and future plans in the context of the competency framework. The portfolio is assessed at the end of the Master program as part of the Final Master Examination.









# 5.

## ALIGNMENT

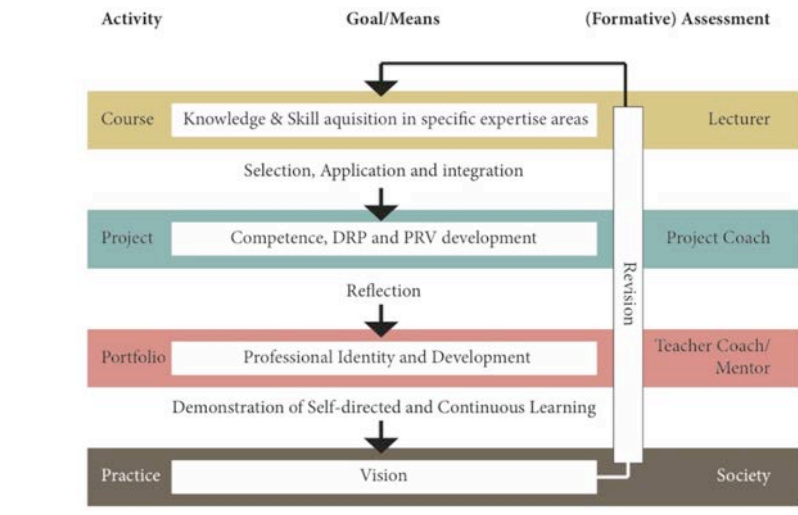
The ID Major and Master are well-aligned and deliberately designed as a learning path of five years offered with increasing freedom of choice within and between learning activities, increasing authenticity of projects, increasing complexity of design challenges and increasing independence of students.

In the programs of the department of Industrial Design students learn to design “intelligent systems, products and related services in a societal context”. To achieve this, students need to demonstrate and develop their ability and attitude as an industrial designer by acquiring, selecting, developing and using the knowledge and skills within specific expertise areas (Business and Entrepreneurship (BE); Creativity and Aesthetics (CA); Math, Data and Computing (MDC); Technology and Realization (TR); User and Society (US); and Design and Research Processes (DRP). They do this to act effectively in design or design research. Furthermore, they need to develop a skillset to act as a professional with a clearly defined Vision and Professional Identity. To realize the aforementioned learning goals students must experience the curriculum as coherent.

The ID Major and Master are well-aligned and deliberately designed as a learning path of five years offered with increasing freedom of choice within and between learning activities, increasing authenticity of projects, increasing complexity of design challenges and increasing independence of students. These design characteristics are the guiding principles in the curriculum design across the years. On a program level, the Major and Master program can also be seen as a logical learning progression. The bachelor program provides the foundation for our mission by creating an awareness of the field of Industrial Design and the ability to act, under guidance, as industrial designers on assignments of limited complexity. In the master program students are coached further towards becoming independent industrial design professionals specializing in the Future Everyday or in Systemic Change.

In the structure of the curriculum it is also strived for coherence on a learning activities level. In both the Major and the Master, vertical and horizontal coherence is present. ‘Vertical coherence’ is created when clear learning pathways and progressions between activities are arranged. e.g. a design research course as preparation for the Design Research project. ‘Horizontal coherence’ is realized when learning activities run in parallel and input from one learning activity can be integrated in another learning activity, e.g. Creative Electronics during Project 1. Many links and connections can be made within the program. It is important for students to see and understand connections between learning activities. Such an understanding will help them attach more relevance to learning activities, make them more motivated to learn and direct their own learning process, support them in applying knowledge, skills and attitudes in new contexts and will be helpful in making learning results more sustainable.

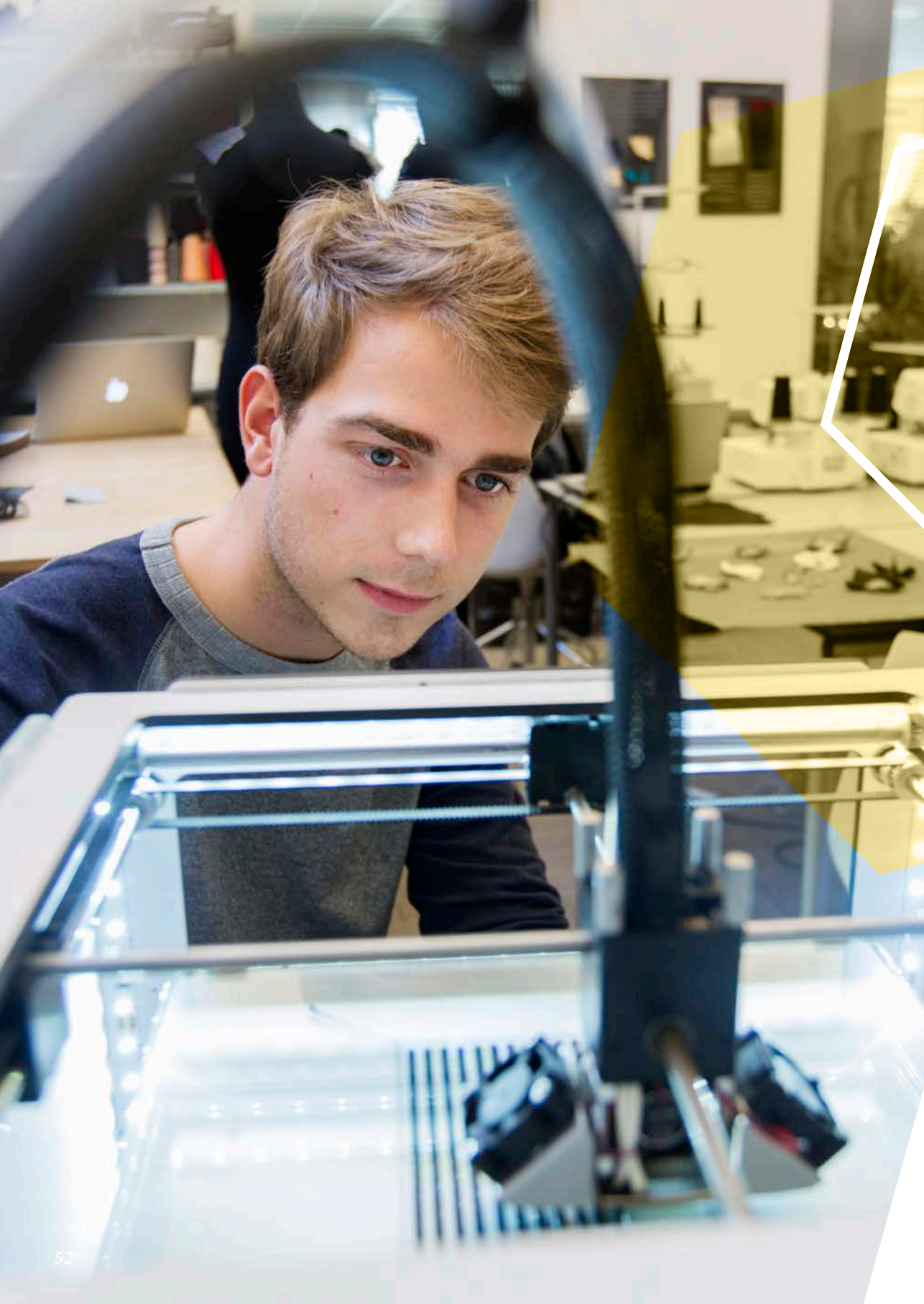
In Figure 5 below, the different learning activities for both the Major and Master are visualised, mentioning their specific objectives and indicating whom performs the (formative) assessment.



**Figure 5.** Overview of the learning process within the Bachelor and Master program

The arrows in Figure 5 point to the pattern of integration that should take place within both the Major and Master. The knowledge and skills from the expertise areas gained in courses should be applied in the projects by students to develop their competencies. Students should reflect on their competence development and relate it to their professional identity and vision and formulate intentions for learning. These intentions for learning need to be realized within the learning activities and courses they choose. So, learning is considered as a layered process. Learning outcomes should be related and integrated in the deep levels of the professional identity and vision to make learning results sustainable and choices for courses coherent, in line with one's ambitions and adding to the unique profile of the students, which will make them stand out in their professional career.







# 6.

# QUALITY ASSURANCE

This last chapter describes how we close the loop to continuously improve and develop our educational programs. It describes the steps and actions that are undertaken for evaluating learning activities in both the Bachelor and Master programs. Feedback from students on learning activities play an important role in this process, as it supports staff in their development as teachers and coaches and the development of our Department.

## 6.1 COLLECTING FEEDBACK

Every quartile an overview is made of courses and projects, and questionnaires are distributed among students in the last week of a learning activity by Quality Assurance. The questionnaires use a five-point scale ranging from 1 (unsatisfied), to 5 (very satisfied) and open questions. Immediately after closing the questionnaire, students receive the evaluation results of the learning activities they enrolled for. Responsible lecturers are notified of the anonymous evaluation results and the Program Director receives a management summary for all evaluated learning activities. In addition, questionnaires are distributed yearly by the National Student Enquiry (NSE) and the Bachelor College, which assess the quality on a departmental and university level. Summaries of the evaluation outcomes are made available for students and staff.

## 6.2 CLOSING THE LOOP

The Quality Assurance officer analyzes the results and discusses the outcomes per learning activity and on a program level with the Program Director. When student satisfaction scores are too low (we strive for a mean score of 4.0 or higher), responsible lecturers are requested to reflect on student feedback. Measures for improvement (e.g. didactical or content-related) are formulated together with the Quality Assurance officer. Furthermore, the Program Committee, which represents both students and staff, is asked to reflect on the results and to advice on the outcomes.

If results indicate that measures for improvement are needed on a program or departmental level (regarding more generic aspects such as projects or output qualifications), the Program Director reflects on the results and asks the Program Committee for advice on measures for improvement. Consequently, the Program Director develops a plan of action, involving various committees and boards. Through our quality assurance procedure we aim for continuous development of our teaching staff and programs.



## 6.3 PROGRAM COMMITTEE

The Program Committee (PC) acts as an independent committee to give advice on all matters of the ID educational system. The quality of education is their main concern.

The PC approves the program and gives advice on all key aspects of the education at ID as well as on the EER (Education & Examination Regulations).

The PC gives advice when asked, and gives advice when not asked but when the PC feels that an advice is needed. The PC keeps short communication lines with the Program Director and the Quality Assurance Officer.

The PC meets regularly and represents the students (one for each year) and educational staff (one for each research group). From 2017-2018 onwards the role of the PC will change because of the new law "*Wet Versterking Universitaire Bestuurskracht*".

## 5.4 YEAR COUNCILS

The Program Committee installed three different student councils to discuss educational matters and compose advices for the Program Committee.

- The P council, representing the first year bachelor students.
- The B council, representing the second- and third year bachelor students.
- The M council, representing the first- and second year master students.

The councils meet on a monthly basis. During these meetings all current learning activities are discussed per group. The councils function as a soundboard group for both electives and squads and can, if necessary, give feedback on the learning activity during the quartile instead of after the learning activity, when feedback is generated by surveys to all students. On top of this they discuss proposed changes or dilemmas from the Program Committee or the Program Director, which are communicated via Lucid's Commissioner of Education.

The job of all councils is to represent as many students as possible, so if students have any questions or topics for the next meeting, they can discuss this with one of the members of the student councils or the commissioner of Education.

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## PHOTOGRAPHY

- Page 7: Hugsy
- Page 8: Vincent van den Hoogen
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