UNIVERSITEIT TWENTE.

Name Module (original name)	Scientific Challenges Industrial Design Engineering
Language	English
Module code	201500005
Contact person	Dr. ir. G.D.S. Ludden
Specific prerequisites (regarding incoming exchange)	Basic knowledge Industrial Design Engineering
Participating study	Industrial Design Engineering
Starting block	1A or 1B

Theme

The module focuses on individually addressing scientific challenges related to the research activities of staff members of the Faculty of Engineering Technology

Content (including project)

The Bachelor's programme Industrial Design Engineering provides students with basic knowledge and skills and a broad view of the field of industrial design engineering. Industrial design engineering is a strongly interdisciplinary domain and structured around four disciplines: basics, styling, humanities & business and engineering. This forms the basis for the interdisciplinary setup of the Bachelor's programme and led to the final qualifications for the programme. These qualifications have been translated into a set of coherent modules with individual objectives and learning outcomes. The projects implicitly and explicitly train professional skills.
Next to the broad basis provided by the programme, a significant number of students is interested in gaining more in-depth knowledge on one of the disciplines mentioned. Given the close relation between the education in the Bachelor's programme and the research in the Faculty of Engineering Design, this comprehensive module aims to allow students to explore and cross the border between education and research. This is done by creating awareness on personal interests and capabilities, based on which students select one (15 EC) or two (7,5+7,5 or 5+10 EC) projects to work on during the module. As the subjects are portals to the research areas of the staff members of the faculty, students will be able to develop themselves more intensively and thoroughly than is possible in the context of the more interdisciplinary modules.

Learning goals

In general, the learning goals will address:

- Personal development as an Industrial Design Engineer
- Development of expertise in a delineated field of expertise
- Autonomous acquisition of knowledge

Additional learning goals are -individually- depicted from the perspective of the chosen subject. This implies that the student has an influence on the establishment of the learning goals. For this reason, the student has to hand in a description of the envisaged learning goals that requires the consent of the related members of the research staff.

Educational forms

The educational form will be depend on the kind of project the student will choose. Typically, students will work individually on projects but working in smaller groups is optional. One of the staff members will be appointed as coach by the module coordinator. During the module, the group of students performing Scientific Challenges will meet on at least two occasions:

1. Half–way during the module students will present their project and progress to the group of students
2. At the end of the module, student will present their work at a symposium with poster presentation open to staff and students.

In principle, students are free to define their own scientific challenge in consultation with a member of scientific staff. Next to this, available topics have been pre-defined. Please contact the members of staff listed on the next page to further discuss the possibilities for projects within a pre-defined topic. To start this module students have to submit a project proposal (half A4) that describes their project(s) to coach and module coordinator.

Assessments

The following type of assessment methods will be used:

- Related to the research topic
  - Research report
  - Peer-review
  - Presentation of research (oral + poster)
- Related to the learning process
  - Short reflection

The final mark is based on a combination of the different assessment methods.

Author Driven Design Project (Wouter Eggink)

Exploring the Design of objects from your own intrinsic motivation, rather than from an external demand driven assignment.

Biomechanical Engineering (Edsko Hekman)

Design of products that strongly interact with people in order to improve health, performance or well-being, such as implants, artificial limbs, body supports, medical tools and medical consumer products.

Blended Space (Robert Wendrich)

Rawshaping Technology Research
Ideation and design representation constitute an important proportion of any design and engineering process. Usability and interaction design (IxD) of computational tools and systems often (i.e. mostly) lack the inclusion of metacognitive, sensory and/or physio-psychological aspects. The need for embedding and inclusion of the aforementioned aspects in the design engineering process calls for new perspectives, holistic viewpoints and novel approaches towards current human machine interface (HMI) and human computer interaction (HCI).

Co-Design/Participatory Design (in Healthcare) (Julia Garde)

Research on how to organize the participation of various people in a design process in a meaningful way to develop products that fit specific user groups (e.g. people with specific diseases or medical specialists). Research can include the development methods of participatory inquiry, material interventions, design tools, workshop formats etc. The focus on healthcare is optional.

Design Competitions (Marten Toxopeus) (5EC)

See the description for more information.

Design for healthy behavior (Geke Ludden)

Research on the design of (persuasive) products and/or systems/services that help people to change their lifestyle in order to improve their (physical as well as mental) health. Research on the design of products and/or services that motivate and empower people to self-manage their health / diseases.

Driver-vehicle interaction: Sensory Enhancement to Retrieve Driving Control (Arie Paul van den Beukel)

Research to develop an improved driver-interface for partial automated driving is carried out at the Faculty ET and is co-sponsored by Ford Motor Company in Köln (Cologne), Germany.

Electric mobility: research into an evolving system of systems (Maarten Bonnema)

Only by joint development of the vehicle, its user interface, the infrastructure and policies, electric mobility can succeed.

Emergence as Guiding Principle for Design Research and Practice (Jörg Henseler)

The principle that “The whole is greater than the sum” was coined by Aristotele and is today investigated under the term “emergence”. Some design researchers regard emergence as a guiding principle for design. The task is to conduct a literature research on the use of emergence in design, and to develop a design example.

Human Technology Relation Aesthetics (Wouter Eggink)

Design Aesthetics for innovative technologies, based on specific acceptance strategies.

Inquiry into the use of empirical methods in design research (Jörg Henseler)

Design research more and more relies on multivariate statistical techniques to empirically assess design concepts and artifacts. Development of a map of which techniques are used for what purpose in design research, and identification of the shortcomings of the extant methods.

Management of Product Development (Eric Lutters)

Research focuses on the improvement of development cycles as a whole or aspects thereof, to better align the goals and opinions of the many stakeholders involved. Topics relate to e.g. design methods/methodology, design rationale, decision making in design, uncertainty and sensitivity in development cycles, the information that underpins development cycles or knowledge that drives those cycles.

Open Script Design (Wouter Eggink)

Improving product attachment and well-being by increasing the room for personal interpretation of products and product use.

Sustainable Enery Design (Angèle Reinders)

Research in the field of Sustainable Energy Design focuses on product development in the framework of sustainability and renewable energy technologies. In particular, innovation and design processes are explored that support a better integration of product design and new energy technologies with the purpose to increase energy-efficiencient behavior by end-users in the context of living, working and mobility in order to create a sustainable future for society.

Systems thinking: how different ways of thinking on systems level can help in the creative development process (Maarten Bonnema)

An interesting starting point is the video by Derek Cabrera: http://youtu.be/dUqRTWCdXt4 (in particular the first half).