Hanze

Course: Project Mechatronics - Design — credits: 5

Course code	ELVB25MPD
Name	Project Mechatronics - Design
Study year	2025-2026
ECTS credits	5
Language	English
Coordinator	J.J. Dallinga
Modes of delivery	Lecture Practical / Training Simulation
Assessments	Project Mechatronics - Design - Assignment

Learning outcomes

Management
The starting professional can professionally set up, define, implement, plan, adjust and deliver a small-scale project on time.

Definition
The starting professional uniformly maps out a problem or customer need, places it in the right context, consults relevant sources and converts this into an objective, problem definition and electrotechnical requirements.

Design
The starting professional considers various solutions in order to arrive at a detailed and well-founded (electro)technical product/service/process based on the program of requirements, using appropriate design methods and taking social interests and engineering standards into account.

Content

In this module the design phase of a mechatronic project will be treated and experienced in depth. Starting at the problem that needs to be solved and progressing up to the point of having a complete design.

Professional Products

- Problem analysis – A representation of a systematic investigation and understanding of a problem, including its causes, consequences, and requirements for a solution. The goal is to gain a clear insight into what the problem is and what is needed to solve it.
- Mechatronic requirements for a (final) product – The defined functional, technical, and performance criteria that a system must meet, covering the integration of mechanical, electrical, electronic, and software components to ensure the product operates reliably, efficiently, and as intended. This includes, for example mechanical, electrical, electronic, control, software, system integration, safety and compliance aspects.
- System design – An overview of components and interactions between different components of a system. It includes the design of software and hardware architecture, components, interfaces, and data.
- Software design – Representation of the structure of software, including all programs, instructions, and data, along with the interactions between them. This can be done using tools such as flowcharts, software structure diagrams, or software documentation.
- Hardware design – Representation of the structure of electrical hardware. This can be done using tools such as circuit diagrams, single-line diagrams, block diagrams, I/O lists, PCB design drawings, 3D drawings, 2D drawings, bill of materials (BOM), or component lists.
- Cost-benefit analysis – A systematic comparison between the expected costs and benefits of a project or decision. The goal is to determine whether the benefits outweigh the costs and if the investment is worthwhile.
- Accountability (document) – A report, presentation, or conversation in which the process of explaining and justifying decisions, actions, and results to stakeholders takes place. It shows how goals have been achieved and resources have been used, often with evidence to ensure transparency and trust. This can be done, for example, in the field of component selection, design choice or with the help of standardization or certification.

Skills
Dependent on the project and the student’s role, some skills will have more or less emphasis

- Mechatronic system design – The process of creating integrated systems that combine mechanical, electrical, and control engineering principles to achieve desired functionality. It involves selecting components, developing control algorithms, and ensuring seamless interaction between the system’s mechanical and electronic parts for optimized performance in applications like robotics, automation, and product development.
- Selection of mechatronic components – The process of identifying and choosing suitable mechanical, electrical, and electronic parts—such as sensors, actuators, motors, and

controllers—based on system requirements, performance criteria, compatibility, cost, and reliability to ensure optimal integration and functionality within a mechatronic system.

- Material selection – The process of choosing the most appropriate materials for a specific application based on factors such as strength, durability, weight, cost, and environmental conditions. It involves evaluating material properties like hardness, conductivity, and corrosion resistance to ensure optimal performance and functionality of the product or system.
- Mechatronic calculations and simulations – Analytical and virtual methods used to predict and evaluate the behaviour and performance of integrated mechanical, electrical, and control systems. Calculations involve formulas and models to determine parameters like force, torque, current, or speed, while simulations use software tools to visualize and test system dynamics, control responses, and interactions before physical implementation.
- Design skills (e.g. ideation and selection, design for tolerances, making design and component choices etc.)
- Project skills (e.g. problem definition, requirements, stakeholder analysis, planning, budgeting, etc.)
- Communication skills (e.g. presenting progress, cooperation, teamwork, feedback, etc.) *Additional skills will be trained dependent on the specific project*

Knowledge

- Dependent on the project, knowledge obtained in other courses of the Mechatronics modules will be deepened and applied. *Additional knowledge will be obtained dependent on the specific project*

Included in programme(s)

Exchange Mechatronics (spring)
Minor Mechatronics

School(s)

Institute of Engineering

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