Hanze

Course: Power Quality & EMC — credits: 5

Course code	ELVB25PQE
Name	Power Quality & EMC
Study year	2025-2026
ECTS credits	5
Language	English
Coordinator	A. Hoogerwerf
Modes of delivery	Project-based learning
Assessments	Power Quality & EMC - Assignment

Learning outcomes

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.

Maintenance
The starting professional ensures that an electrotechnical product/service/process functions in accordance with specific quality criteria by means of repair, maintenance or (use/maintenance) instructions.

Advice
The starting professional presents and documents substantiated results in accordance with engineering standards, draws logical conclusions and gives advice on a (future) product/process/method in an electrotechnical context.

Content

In this module, the fundamentals of Power Quality in electricity grids, and the related standards & Limits will be studied. In addition, the basics of Electromagnetic Compatibility (EMC) are studied and converted into a design.

Professional Products

- Energy-technical requirements for a (final) product – The technical specifications and preconditions required to design, implement and operate an energy-related system, plant or component according to the desired performance. In this module: Requirements related to standards, norms and EMC
- Energy-technical specifications of a (sub)product – The technical characteristics and performance requirements related to the energy use, energy transfer, or energy generation of the product or component. This includes, for example, parameters such as power, efficiency, voltage, current, frequency, thermal properties, and compatibility with energy sources or systems. *In this module: EMC and power quality related specifications*
- 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. *In this module: an EMC related design*

Skills

- Design for EMC compatibility – The ability of an electronic device to function without interference in an electromagnetic environment, while not itself causing harmful electromagnetic interference (EMI) to other devices.
- Working with certification and standards – Developing and executing processes, products or services according to recognized standards.
- Testing and measuring on an energy technology system – The process of evaluating the performance, efficiency, and safety by using specialized instruments to measure key parameters such as voltage, current, power, frequency, and temperature. This process ensures compliance with design specifications, identifies faults, and optimizes system operation for reliability and efficiency.

Knowledge

- Power Quality – The stability and reliability of electrical power supply, ensuring that voltage, frequency, and waveform remain within acceptable limits. Key aspects include voltage stability, harmonic distortion, power factor, and transient disturbances, which impact the efficiency and performance of electrical systems
- Electromagnetic emission – The (unintended) release of electromagnetic energy from electrical and electronic devices, which can interfere with nearby equipment or communication systems.
- Electromagnetic immunity – The ability of a device or system to resist the effects of external electromagnetic interference (EMI) without experiencing performance degradation or failure.
- Grounding and bonding – Grounding refers to the practice of connecting electrical systems or equipment to the Earth to provide a safe path for fault currents, stabilize voltage, and reduce the risk of electric shock. Bonding involves the electrical connection of all exposed metal parts of a system to ensure they

have the same electrical potential, preventing dangerous voltage differences that could lead to electric shock or equipment damage.

- Common mode current – The (unwanted) current that flows in the same direction on all conductors of a system, relative to a common reference point, such as ground. It often results from electromagnetic interference (EMI) and can cause disturbances in electronic equipment or signal degradation.

Included in programme(s)

Exchange Energy & Power Electronics (autumn)
Minor Energy & Power Electronics

School(s)

Institute of Engineering

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