## M 6.3: $H_2$ -Technologies

| | | | |
|---|---|---|---|
| **Responsible for the module:** | Prof. Dr. Jürgensen, Lars | | |
| **ECTS credits:** | 6 ECTS | **Total workload:** | 180h |
| **Use of the module in this degree programme:** | Mandatory module at 6. Semester | **Of which face-to-face studies:** | 60h |
| **Duration and frequency of the offer:** | 14 Dates in SoSe | **Of which self-study:** | 120h |
| **Use of the module in other degree programmes or scientific courses. Further education courses:** | | | |

**Learning outcomes:**

Knowledge and understanding (broadening knowledge, deepening knowledge, understanding knowledge)

- Dimension of hydrogen production plants by means of water electrolysis with all plant components, apparatus and piping.

Use, application and generation of knowledge (utilisation and transfer, scientific innovation)

- Identify the key issues of a Power 2X task with a focus on water electrolysis and create solutions.
- Design the measurement and control technology required for optimum operation and present it in the form of R+I flow diagrams.
- Apply the essential regulations and standards for the safe design and operation of electrolysers.

Communication and cooperation

- Present the solution concept in the form of basic and process diagrams

Scientific self-image or professionalism

- Students will be able to identify and discuss the challenges faced by manufacturers and operators in the construction and operation of hydrogen plants on the basis of technical regulations and ordinances.

**Teaching content:**

The module teaches basic knowledge of plant operation technology using the example of Power-2-X plants. The following aspects are covered in detail:

- Analysis of Power-2-X issues with the aim of a safe operating concept
- Optimal choice of possible solutions, e.g. electrolysis technology (AEL, PEM, etc.)
- Presentation of the developed solution concept using basic and process flow diagrams with AUTOCAD and R+I-CAD
- Selection and dimensioning of optimal pumps
- Selection of optimal system components such as sensors and separators
- Present the advantages and disadvantages of these system components for the concept at hand.
- Measuring this plant component by applying balance equations
- Determine a measurement technique required for optimal operation
- Optimal choice between manual control or control loops
- Basics of R+I flow diagrams and presentation of the MSR technology of the solution concept
- Safe operation of laboratory electrolysers of different technology
- Assembly, dismantling and commissioning of experimental set-ups for water electrolysis
- Relevant regulations and standards, e.g. BetrSichV, GefStoffV, TRGS, ProdSichV etc.

| | |
|---|---|
| **Language of instruction:** | English |
| **Participation requirements:** | None |

| | |
|---|---|
| **Preparation/Literature:** | *Current literature lists are handed out at the beginning of the semester.* |
| **Further information:** | *See Aulis* |

| **Related courses** | | | | |
|---|---|---|---|---|
| **Title of the course** | **Lecturer** | **SWS** | **Teaching and learning methods** | **Forms, scope and duration of examinations** |
| $H_2$-Technologies | Prof. Dr Lars Jürgensen | 3 | Seminar | Portfolio (PL) |
| $H_2$-Lab | Prof. Dr Lars Jürgensen | 1 | Laboratory | |
| Module-related tutorial | Prof. Dr Lars Jürgensen | 1 | Guided self-study | |