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| Department | 04 Electrical Engineering and Information Technology |
| Course title | Batteries and Fuel Cells |
| Hours per week (SWS) | 3 |
| Number of ECTS credits | 5 |
| Course objective | <ul style="list-style-type: none"> • Technological overview of fuel cells, their classification and different properties. Requirements for operation, factors influencing power density, efficiency and costs. • Technological overview of modern and future battery systems, especially high-temperature batteries (NaS, NaNiCl₂) and redox flow batteries (vanadium systems and alternatives). • In-depth study of the topic of lithium batteries, particularly with regard to future trends (5V materials, lithium sulphur, lithium-air). • Modern electrotechnical analysis methods for batteries and fuel cells, especially the electrochemical impedance spectroscopy and models derived from it. Development of equivalent circuit models and their parameterization via measurements. • Modern model-based methods for determining the condition of batteries and fuel cells. • Deepening of the understanding of fuel cells and batteries as well as their analysis methods and modeling through three laboratory practicals |
| Prerequisites | Recommended: Basic knowledge of electrical energy storage |
| Recommended reading | <p>Jossen, A. & Weydanz, W. Moderne Akkumulatoren richtig einsetzen, Inge Reichardt Verlag, 2006</p> <p>Linden, D. & Reddy, T. B. (ed.) Handbook of batteries McGraw-Hill Professional, 2001</p> <p>Korthauer, R. (ed.): Handbuch Lithium-Ionen-Batterien, Springer Vieweg, 2013, ISBN 978-3-642-30653-2</p> <p>Kurzweil, P.: Brennstoffzellentechnik: Grundlagen, Komponenten, Systeme, Anwendungen, Vieweg+Teubner Verlag; Auflage: 2003, ISBN-13: 978-3528039653</p> <p>Vielstich, W., Lamm, A. (ed.): Handbook of Fuel Cells: Fundamentals, Technology, Applications, John Wiley & Sons; Auflage: 1 (2003), ISBN-13: 978-0471499268</p> |
| Teaching methods | Seminar-based instruction with integrated exercises/integrated internship |
| Assessment methods | Written exam, 90 min |
| Language of instruction | English |
| Name of lecturer | Dr. Tobias Greese |
| Email | tobias.greese@hm.edu |
| Link | https://www.ee.hm.edu/fk04/profs/bohlen.de.html |
| Course content | See handbook for the master program "Elektrotechnik und Informationstechnik", https://ee.hm.edu/studierende/modulhandbuecher.de.html |
| Remarks | |