Valid from 2024.HS

Module description: Smart Grid and Electromobility

Module Code	t.BA.EU.PM4.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IEFE
Module Coordinator	Franz Baumgartner
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 4* 4 lab lessons per semester week and half-class
Module Description	Electromobility offers the potential to replace a large part of today's fossil mobility with renewable sources. By designing and analyzing different usage and charging strategies for electromobility, preferably powered by solar, wind and biomass, different scenarios of technical and economic interaction are developed (Smart Grid E-Mobility SMEM). In this project module, students learn about the state of the art of the SMEM core element in the interaction between vehicle and charging infrastructure. The student teams then develop their own innovative solutions and present them.
Module Content	**Renewable production for EVs** • technical parameter and charging profile • technical parameter or renewable sources and their supply profile, PV carport • Knowledge of control strategies of SMEM solutions, e.g. single-family home control of EV charging with PV inverter **Power grid and integration of EVs and E-trucks and E-buses** • Simultaneity factors of many EVs during group charging, e.g. underground car park in the building, local grid limits in the building or in large car parks • EV fleets also including bidirectional charging functions of EVs and e-trucks • Planning of the charging infrastructure in the distribution grid, including possible control of the charging process by the network operator within certain limits, local battery storage • Special tariff models for EVs, bidirectional EVs or fleet management of EVs including PV power plant at another location **Hardware charging station of EVs and E-trucks** • DC, AC charging with and without cooled charging cables, power, costs • Magnetic coupling or charging of e-trucks via overhead line wire, function, performance, costs **Development of innovative solutions** • Source search and novelty analysis of SMEM solutions, special references, special patent classes, special conferences... • Development of new innovative SMEM solutions in a team using different methods, design thinking.... **Methods for organization and publication/presentation** • teamwork and project planning • preparation of reports and presentations in German and English
Prerequisite Knowledge	

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Learning Objectives (Competences)

Students...	Competencies	Taxonomies
Knowledge of the technical parameters of the hardware of different renewable power generation technologies like, CO2 emission, costs, availability and supply profile as well as typical types of charging stations. Knowledge of typical algorithm to control the charging process of electrical vehicles and maximise the renewable charging share, minimise CO2 and costs.	F	K2, K3
Knowledge of the technical parameter of different types of electrical vehicles like battery capacity, consumption, bill of materials and environmental relevance and their charging profile.	F	K2, K3
Gain experience in developing an innovative SMEM solution. To do this, the novelty of your own solution must be intensively examined based on a state-of-the-art study of literature and patents. The solution should be described and presented as specifically as possible in terms of technical and economic key data, as preparatory work for implementation in a start-up or a company department.	M, F, SO, SE	K2, K3, K4, K5, K6

Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
other			0	

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
Report State of the Art	Grade		30	acc. to module agreement
written exam	Grade	30	20	acc. to module agreement
Conference Presentation	Grade		20	acc. to module agreement
Final report Innovation	Grade		30	acc. to module agreement

Classroom Attendance Requirement

None

Learning material

Comments