MSE | MASTER OF SCIENCE IN ENGINEERING

Zürcher Hochschule für Angewandte Wissenschaften
zh aw School of Engineering

Supplementary Course (EVA) at ZHAW School of Engineering

Title: System Dynamics Simulation of Socio-Technical Transitions

Short Code: SimTech mEVA_XY

Credits	3
Profile	Energy & Environment (EnEn)
Responsible Institute /Centre	Institute of Sustainable Development (INE)
Responsible lecturer and contact informtion	**Silvia Ulli-Beer (ullb@zhaw.ch)**
Type and duration of examinations	Oral Presentation of Model and Simulation results (15min)
Start date and duration	Semester: Spring Detail: Feb 2024
Location	ZHAW Zürich, Lagerstrasse
Course type	EVA: Four-five workshops (teaching, in-class activities and group work progress meetings; total 30 hours) separated by independent self- study immersion and small group work periods (total 60 hours). In-class attendance is required and compulsory.
Language of instruction	English
Short description (max. 300 characters)	Technological (eco-) innovations are crucial for entrepreneurs to stay competitive and to satisfy societal needs in a sustainable manner, if they were used widely. Successful marketing of (eco-) technologies requires clear understanding of the impact of organizational and economic decision contexts. This EVA introduces and applies system dynamics modelling as a helpful tool for the analysis of the complex socio-economic interactions influencing the market success of (eco-) technologies supporting socio-technical transitions to sustainability. It includes designing and simulation of socio-technical system architectures, strategy and policy evaluation as well as sensitivity analyses.
Contents and Learning Objectives	**Goals:** In this Module, the students will gain competences in understanding the conceptual approach to system dynamics modelling of socio-technical system architectures develop and apply strategy, scenario experiments or sensitivity analysis for future oriented system analysis

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	acquire insights into the barriers and drivers of technological (eco) innovations and socio-technical transitions apply successfully tools and software (e.g. Vensim) **Contents:** Workshop 1: Introduction into concepts of socio-technical transitions and System Dynamics Modelling based on successful small models and applications in case studies and flight simulators. Workshop 2-3: Developing own simulation models or adjusting existing model structures (respecting the system dynamics modelling competence level of the students). Workshop 4: Designing strategy, scenario experiments and sensitivity analysis, Workshop 5: Presentation of small group works, debriefing.			
Prerequisites	Bachelor of Science of equivalent, English language skills			
Literature	Sterman, J. Business Dynamics (2000), Irwin McGrew-Hill. Ulli-Beer, S. (ed., 2013). Dynamic Governance of Energy Technology Change: Socio-technical transitions towards sustainability. Series: Sustainability and Innovation. Springer-Verlag Heidelberg, 252p. Kubli, Merla; Ulli-Beer, Silvia (2016). Decentralisation dynamics in energy systems: A generic simulation of network effects. *Energy Research & Social Science*, 13: 71-83. Further literature and websites will be provided during the Module.			
Special requirements	The software Vensim will be used (a free version can be downloaded)			
Offer for profiles	Aviation (Avi)	☒	Business Engineering (BE)	☒
	Computer Science (CS)	☒	Data Science (DS)	☒
	Electrical Engineering (ElE)	☒	Energy & Environment (EnEn)	☒
	Mechanical Engineering (ME)	☒	Mechatronics & Automation (MA	☒
	Medical Engineering (Med)	☐	Photonics (Pho)	☒
			Civil Engineering (CE)	☒