

Supplementary Course (EVA) at ZHAW School of Engineering

Title: System Dynamics Simulation of Socio-
Technical Transitions

Short Code: rEVA_SimTech

ECTS Credits	3
Profile	Energy & Environment (EnEn)
Responsible Institute /Centre	Institute of Sustainable Development (INE)
Responsible lecturer and contact information	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: February
Location	ZHAW Zürich, Lagerstrasse
Course type	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)	<p>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.</p> <p>It includes designing and simulation of socio-technical system architectures, strategy and policy evaluation as well as sensitivity analyses.</p>
Contents and Learning Objectives	<p>Goals:</p> <p>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</p> <p>acquire insights into the barriers and drivers of technological (eco) innovations and socio-technical transitions apply successfully tools and software (e.g. Vensim)</p>

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	Contents:			
	<p>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.</p> <p>Workshop 2-3: Developing own simulation models or adjusting existing model structures (respecting the system dynamics modelling competence level of the students).</p> <p>Workshop 4: Designing strategy, scenario experiments and sensitivity analysis, Workshop 5: Presentation of small group works, debriefing.</p>			
Prerequisites	-			
Literature	<p>Sterman, J. Business Dynamics (2000), Irwin McGraw-Hill.</p> <p>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.</p> <p>Further literature and websites will be provided during the Module.</p>			
Special requirements	The software Vensim will be used (a free version can be downloaded)			
Offer for profiles	Aviation (Avi)	<input checked="" type="checkbox"/>	Business Engineering (BE)	<input checked="" type="checkbox"/>
	Computer Science (CS)	<input checked="" type="checkbox"/>	Data Science (DS)	<input checked="" type="checkbox"/>
	Electrical Engineering (EIE)	<input checked="" type="checkbox"/>	Energy & Environment (EnEn)	<input checked="" type="checkbox"/>
	Mechanical Engineering (ME)	<input checked="" type="checkbox"/>	Mechatronics & Automation (MA)	<input checked="" type="checkbox"/>
	Medical Engineering (Med)	<input type="checkbox"/>	Photonics and Laser Engineering (Pho)	<input checked="" type="checkbox"/>
	Information and Cyber Security (ICS)	<input checked="" type="checkbox"/>	Civil Engineering (CE)	<input checked="" type="checkbox"/>