Module description: Aviation Systems Engineering

Module Code	t.BA.AV.SYSENG-EN.19HS
ECTS Credits	4
Language of Instruction/Examination	English
Organizational Unit	ZAV
Module Coordinator	Rolf Steinegger
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 3c*** 2 lecture lessons per semester week each yearly starting-class + 2 lab lessons per semester week and class
Module Description	The overriding goal of the Systems Engineering module is to enable students to systematically solve problems, with the goal of achieving informed simplicity with a reasonable effort according to Pareto's principle.
Module Content	• A) Systems Engineering according to the V-model (INCOSE): • - systems life cycle management • - stakeholder analyses & technical requirements definition • - architectural design • - design implementation • - integration & interface management • - system verification and validation • - deployment and operation • B) Systems Engineering (including Project management): The students understand basic methodoly and calculation techniques for • - description, measurment and reduction of complexity of systems • - derivation and understanding of essential key figures and parameters in airline business and flight mechanics • - knowledge of basic techniques in modelling: black box, flows of materials and informations in systems a.o. • - the application of the problem-solving process in any phase of the life cycle of a system: from rough to detail; thinking in alternatives, in a networked fashion and beyond bounderies; anticipation of changes over time - including a systemic approach for the synthesis of solutions and their assessment • - scientific approach including ceteris paribus (all other things being equal) a.o. • Systems dynamics, especially • - life-cycle-costing of single systems and fleets (systems of systems) • - World population growth • - Cash-Flow-Cycles with systemic delays • - system dynamics according to Jay W. Forrester: supply chain, bullwhip-effect
Prerequisite Knowledge	This course is open to all students who have passed the first year assessment exams. External auditors should possess a basic knowledge of classical physics and business operations as well as some concepts of aircraft aerodynamics.Since this course is held in English, good comprehension skills of this language are required.

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Learning Objectives (Competences)

Students...	Competencies	Taxonomies
Understanding the systems engineering approach according to INCOSE and ETHZ for the application of the life cycle management	F	K3
Unterstanding the V-model from stake holder analysis to the commissioning and operation of a system till the end of life	F	K3
Understanding and interpretation of complex literature with regard to systems engineering and selected tasks.	M	K4
Application of basic techniques to solve simple to complex problems.	M	K4
Assessment of typical tasks and solutions regarding methodology and complexity.	M	K6

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Performance Assessment	End-of-module exam	Assessment	Length (min.)	Weighting	Form
	written exam	Grade	90	60	acc. to module agreement

	Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
	report	Grade		4	acc. to module agreement
	report	Grade		4	acc. to module agreement
	report	Grade		4	acc. to module agreement
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Classroom Attendance Requirement	None
Learning material	• According to specifications on MOODLE. • Haberfellner, Reinhard (Hrsg.) et al (2012, 12. Völlig neu bearbeitete Auflage): Systems Engineering – Grundlagen und Anwendungen. Orell Füssli Zürich (463 Seiten). • Donella H. Meadows (2010): Die Grenzen des Denkens - Wie wir sie mit System erkennen und überwinden können. oekom. • Wiegand, Jürgen (2005): Handbuch Planungserfolg - Methoden, Zusammenarbeit und Management als integraler Prozess. vdf Hochschulverlag ETH Zürich. • Dörner, Dietrich (7. Auflage 2008): die Logik des Misslingens - Strategisches Denken in komplexen Situationen. rororo science Hamburg. • Gomes / Probst (1999, 3. Auflage): Die Praxis des ganzheitlichen Problemlösens - vernetzt denken, unternehmerisch handeln, persönlich überzeugen. Haupt Berne (299 Seiten). • Weibel, Benedikt (2014): Simplicity - die Kunst, die Komplexität zu reduzieren. NZZ libro (176 Seiten).
Comments	