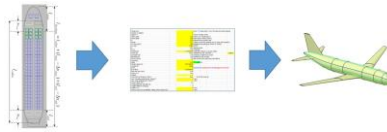


Syllabus for

**SARC-ASE-01 -- Aircraft Systems Engineering**

CREDITS 6.0 credits

EXAMINER Petter Krus, Linköping University (LiU)

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TARGET GROUP Doctoral students in aeronautics who want to gain knowledge in model-based product/design development on example of a complex aircraft (in the conceptual design stage).

PREREQUISITES Doctoral students in aeronautics with basic background in aircraft (conceptual) design (e.g. recommended to have read the Raymer S4 2019). Prior knowledge in simulation and modelling not required.

AIM The course covers the conceptual aircraft design sizing process of civil airplane. Focus is on simulation-based design (space) exploration and evaluation. Furthermore, heading towards systems engineering, aircraft on-board systems with focus on the primary control system are presented and modelled in a cyber-physical simulation tool (HOPSAN). The course is directed to simulation-based engineering. It will not cover the topics of simulation modelling theory in general (theory, languages and modelling), optimization, and design analysis.

LEARNING OUTCOMES After the course, the student shall demonstrate knowledge and understanding of:

- Development process and the conceptual sizing of a civil transportation airplane
- The use of simulation models within product development
- Cyber-physical simulation model implementations
- On-board power systems including electrical propulsion
- Simulation-based system architecture evaluation

The student shall demonstrate skill and ability in:

- Conduct easy (non-multi domain) sizing process (based on a constrain diagram)
- Modelling of cyber-physical components and systems
- Conduct simulation-based system evaluation and interpretation of simulation results.

CONTENTS The course contains the following topics:

- Aircraft conceptual design with focus on civil transportation aircraft:
 - Cabin design & influence on configuration/performance
 - Stability & control; trim drag
- Whole aircraft system simulation on example of an electric airplane
- On-board system architecture and systems simulation

ORGANISATION Three physical meetings in Linköping, 2 days per meeting.
One one-day examination presentation meeting.

LITERATURE Course Compendium

Moir, I. & Seabridge, A. G.: *“Aircraft systems: Mechanical, electrical, and avionics subsystems Integration”*, Chichester, West Sussex, England; Hoboken, N.J. : J. Wiley & Sons Ltd., 2008

EXAMINATION The main examination task is a written project report that can be aligned towards the PhD students’ research.

The grade is passed/not passed.

REMARKS The course is aligned to build-up on the knowledge gained at the SARC S4 Summer School 2019

INDUSTRIAL MEMBER FEE --