



ASSETS+
Alliance for Strategic Skills addressing Emerging Technologies in Defence

EDUCATION & TRAINING

System Engineering (ID 7.8)



Co-funded by the
Erasmus+ Programme
of the European Union



**POLITECHNIKA
RZESZOWSKA**
im. IGNACEGO ŁUKASIEWICZA

DESCRIPTION OF THE COURSE:

- **Context:** Aviation and space systems are complex products comprised of many subsystems which must meet demanding customer and operational lifecycle value requirements. Traditional systems engineering approaches to air and space systems design have been upended by two trends – increasing complexity and accelerating delivery timelines. Up-to-date methods to be applied in the current and future industry, e.g. aerospace and defence industry.
- **Objectives:** The main educational goal of the course is to acquire knowledge and skills in the field of modern methods and computer tools supporting the process of conceptual and initial design of complex aviation and space systems. Digital mission engineering and model-based systems engineering (MBSE) are essential to these new challenges, enabling a system integrator to redirect work from physical systems to their logical representations. Digitization of the design processes of aviation and space systems integrated with missions requires the use of advanced techniques and computational tools. An additional purpose is to show the strong interdependence between design tools and design processes. One of the course specific objectives is to explain the role of each tool at each product development phase.
- **Pre-requisites:** General knowledge about aviation technologies



This programme is focused on:

- Professionals working in Defence and AeroSpace Industry (up-skilling and re-skilling activities) and
- University Licence students

IMPORTANT: This prototyped programme is **EXCLUSIVE FOR** partners of the [ASSETs+](#) [consortium](#) and [associated stakeholders](#).

If you want to join the ASSETs+ Stakeholders Group and become part of our ecosystem, please, [click here](#).



General information

- **Format:** Online
- **Language:** English
- **EQF level:** 7
- **Instructor:** Prof. Andrzej Majka
- **Hours:** 2h lectures
10 min test
5h homework
- **Host institution:** Politechnika Rzeszowska im. Ignacego Łukasiewicza



Programme schedule

20/03/2023 11:00 – 11:30	Introduction to the theory of aerospace system designing and systems engineering (SE) approach
20/03/2023 11.30 – 12:00	Computer Aided Engineering (CAE), Mission Engineering, Digital Engineering (DE), Model-Based Engineering (MBE), Model-Based Systems Engineering (MBSE) - definition, characteristics, examples
20/03/2023 - 24/03/2023	Homework: 5h
24/03/2023 11:00 – 11:30	Formal methods in aerospace design and engineering. The Systems Modelling Language (SysML) – introduction, description, examples
24/03/2023 11:30 – 12:00	Characteristics of SE, MBE, MBSE tools
24/03/2023 12:00 – 12:10	Test



Learning outcomes:

Knowledge

- Has general knowledge necessary to understand the main problems in aerospace engineering.
- Has general knowledge of the methodology and usage of the CAE approach to engineering design of aerospace systems
- Has ordered, theoretically founded general knowledge in the field of mission-based and model-based approach to systems design and engineering
- Has general knowledge related to the methods of modelling, analysis and design of aerospace systems
- Has general knowledge related to the engineering tools for modelling, analysis and design of aerospace systems

Technical Skills

- Can select existing computer tools to design a product and solve optimization tasks
- Can identify scientific research topics in aerospace engineering
- Can identify methods used in system engineering
- Can analyse the literature and publications in the field of aerospace engineering and design
- Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books

Transversal Skills

- Is ready to critically evaluate the knowledge and content received, recognize the importance of knowledge in solving cognitive and practical problems
- Understands the need for lifelong learning
- Is aware of the social role of a technical university graduate, and especially understands the need to formulate and convey to the society, in particular through the mass media, information and opinions on technological achievements and other aspects of engineering activities



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