

Training Opportunity for Polish National Trainees

| Reference | Title | Duty Station |
|----------------|------------------|--------------------|
| PL-2023-OPS-GA | Mission Analysis | ESOC, Darmstadt |

Overview of the mission:

The Polish National Trainee will be part of the Mission Analysis Section, Flight Dynamics Division, Ground Systems Engineering Department. The Mission Analysis Section is entrusted with mission studies for future terrestrial, lunar and interplanetary missions as well as scientific missions located in planetary or lunar libration points with emphasis on trajectory and attitude related aspects, and on supporting ground segment design and operations. This includes trade-offs for selection of the nominal mission trajectory, definition of manoeuvring strategies, optimization of orbital manoeuvres (low- and high-thrust propulsion, including rocket ascent trajectories), calculation of propellant budget, analysis of launch window, analysis of orbit perturbations and navigation. The task also includes development of the necessary analytical and numerical methods and software tools.

Overview of the field of activity proposed:

Digital and Model Based Systems Engineering is being rapidly adopted across academia, industry and agencies both within and outwith the space sector as an enabler of efficiency, effectivity and collaboration throughout the lifecycle of complex systems. At the same time the barriers to entry and adoption of MBSE at scale are clearly evident and relate to challenges at a technical, organisational and cultural level.

Learning curves associated with commercial tools imply long familiarisation phases, or the necessity for dedicated MBSE experts to support project teams. Utilising established MBSE tools in the Agency, an objective is to gradually digitalise the various engineering domains of mission ground segment and operations, enabling digital continuity across the domains, across partners, and throughout the engineering lifecycle.

One such domain of interest is that of Mission Analysis. Many spacecraft subsystem designs depend on the data provided by Mission Analysis. While these are currently exchanged via offline file sharing or e-mail, many of them could be provided as part of the system model. Likewise, the trajectories, manoeuvres and budgets planned by Mission Analysis depend on ground segment and spacecraft constraints, which again could be formally defined and optimised utilising an overall system model. Some tools could even be interactive, allowing model users to immediately experience the consequences of a design change. More broadly, the objectives of the National Trainee are to facilitate greatly increased efficiency of engineering tasks. The national trainee will work closely with the domain specific experts across ESOC and with ESTEC colleagues (TEC-SYE) to align with space segment MBSE efforts and infrastructure developments.

Required education and skills:

- You should have just completed, or be in the final year of your Master's degree in a scientific or technical discipline.
- Good interpersonal and communication skills
- Ability to work in a multi-cultural environment, both independently and as part of a team
- Fluency in English and/or French, the working languages of the Agency