

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
In Orbit - Postgraduate Space Education (4)

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SEEDS, THE INTERNATIONAL POST-GRADUATE MASTER PROGRAM FOR SPACE  
EXPLORATION

**Abstract**

The SEEDS (SpacE Exploration Development Systems) initiative was initially conceived and promoted by Politecnico di Torino and Thales Alenia Space-Italy in 2005. It aimed at establishing a post-graduate International Master Program in space exploration to offer an opportunity to young engineers to get prepared for the future of Europe in space and specifically in human space exploration. The first phase of SEEDS started in 2005 and ended in 2010. Supaero Toulouse and Universität Bremen (together with ZARM) participated to the first phase of SEEDS with Politecnico di Torino. The second phase of SEEDS started in 2013 and is currently in process. Supaero Toulouse and Leicester University participate to the second phase of SEEDS together with Politecnico di Torino. Turin, Toulouse and Leicester have a long common tradition of space activities at both the industrial and academic level and within the SEEDS initiative they represent three poles of European cooperation in space programs. The Master course comprises two different steps in sequence: an initial learning phase and a Project Work phase. Both phases pursue a multidisciplinary approach, where all specialized disciplines are integrated to make

the students able to acquire the system view and then to accomplish the conceptual design of a selected case-study. The distinguishing feature of SEEDS is the Project Work activity, performed by all students together under the supervision of academic and industrial tutors. Main objective of the Project Work is to train the students on the basic principles of the system engineering design, through their application to a well-defined project related to a specific human space exploration mission. The Project Work includes the Preparatory Work, during which the students identify the complete architecture and overall scenario of the mission, and the conceptual design activities, performed in the three European sites to develop a limited number of building blocks. The first year of activity started in November 2005 with the full support of the Human Space-Flight Microgravity and Exploration Directorate of ESA. Six academic years of activities have passed since then and six project works have been successfully completed, dealing with various space exploration themes. The paper focuses on the description of the Master Program and on the main results achieved in terms of project work activities and development of the future space workforce. The positive experience of seven years of SEEDS is brought to evidence and the lessons learned are discussed.