

Objective of the Master's Degree Program in Space Engineering and Professional Competencies

Program Objective:

The aim of the program is to train space engineers who are capable of performing engineering-related design, development, manufacturing, and operational tasks in connection with space technology and space research. They possess relevant knowledge about the characteristics of the space environment, the structure and development processes of equipment intended for operation in space, and the design, construction, and operation of ground support systems for space devices. They are qualified to carry out research and development tasks at domestic and international space industry companies and institutions. Graduates are prepared to continue their studies in doctoral programs.

Professional Competencies to be Acquired

a) Knowledge

- Understands advanced mathematical and physical principles and methods necessary for practicing in the field of space technology.
- Knows the objectives of space research and space technology, and is familiar with past and planned missions, including their scientific and commercial goals.
- Understands the unique physical properties of outer space and the requirements for equipment intended to operate there, including the physiological effects of space and mechanisms for mitigating environmental impacts.
- Has knowledge of the types and applications of special materials, structures, and systems used in space.
- Understands the operation of basic units of space equipment, their implementation technologies, principles of reliability and quality assurance, and practices for designing redundant systems.
- Is familiar with the specific requirements regarding the interaction of space equipment with each other and the space environment, and the related design, testing, and operational methods.
- Knows the structure, operation, and implementation processes of ground support units for space equipment.
- Is familiar with hardware and software tools, programming languages, and development platforms related to space technology.
- Understands the physical and technological aspects of satellite communication.
- Is familiar with wireless and satellite data transmission systems, and the methods of data collection, archiving, and post-processing.
- Knows the measuring instruments and tools used in space technology.
- Understands the process of planning, documenting, and executing space projects.
- Has English language proficiency sufficient for the program and for continuous professional self-development.
- Has English language skills at a level required to perform professional tasks related to the qualification.

b) Skills

- Able to assess the implementation conditions of a scientific or commercial space mission, plan the necessary development process, and select the most suitable experts for each subtask.

- Capable of identifying the specific effects acting on space equipment during its operational lifetime and developing the necessary protection systems.
- Able to apply learned procedures to perform design, development, and operational tasks for space equipment and related ground support units.
- Works effectively in teams with representatives of their own and other disciplines to solve specific problems.
- Able to understand and process professional literature in English.
- Communicates professionally in English with users and fellow experts.
- Capable of continuous self-education, keeping pace with the development of the space technology profession and industry.
- Depending on their professional orientation, they are also capable of:
 - Selecting the appropriate orbit and launch service provider for a space mission and managing the related licensing process;
 - Specifying, constructing, and testing equipment, instruments, or sensors intended for deployment and operation in space, in collaboration with experts from related scientific fields;
 - Supervising and managing the manufacturing, production, and quality control of space equipment;
 - Designing and managing the implementation of ground support units for space equipment;
 - Designing, developing (using modern development tools), and testing ground and onboard software for space missions;
 - Specifying and designing radio communication devices for onboard and ground stations of space equipment;
 - Designing software for receiving, recording, archiving, and post-processing data from space equipment.

c) Attitude

- Open to learning new research and development methods and technological procedures, and capable of mastering them at a practical level while keeping pace with their evolution.
- Open to understanding other disciplines that apply space technology and solving technical problems in collaboration with experts from those fields.
- Understands and embraces the ethical principles and legal aspects of the profession, fully considering them in decision-making situations.
- Ensures the ethical use and protection of the space environment during mission planning.
- Strives for efficient and high-quality work.
- Pays attention to the safety of technologies, data, and information of colleagues and clients.

d) Autonomy and Responsibility

- Represents their professional opinion independently in decision-making situations, thinks through specific professional issues, and develops solutions based on available sources, planning and executing their activities independently.
- Feels responsible for research, development, and operational activities performed individually or in teams, mobilizing their theoretical and practical knowledge and skills autonomously but in cooperation with team members to achieve goals.
- Strives to eliminate deficiencies and risks of applied technologies, and independently applies a wide range of methods and techniques in various complex and unpredictable contexts.
- Aims to meet the specific safety requirements of space equipment.
- Takes responsibility for the environmental and societal impacts of decisions made in complex situations.