

Overview of the curriculum of master's specialties on a Space technology in the Universities of the Uzbekistan

The Government of the Republic of Uzbekistan pays much attention to the development of new innovation technologies in the country. On August 31, 2019, the Decree of the President of the Republic of Uzbekistan “On the development of space activities in the Republic of Uzbekistan” was signed. According to this decree, in order to effectively realize the existing scientific and technical potential for further sustainable development of the country, including through the use of innovative space technologies in various sectors of the economy, as well as ensuring the security of the Republic of Uzbekistan, the Space Research and Technology Agency under the Cabinet of Ministers of the Republic of Uzbekistan has been created - "Uzbekcosmos".

The main objectives of the Agency "Uzbekcosmos" identified:

- development and implementation of a unified state policy and strategic directions in the field of space research and technology;
- development and implementation of state programs for the development of the space industry in the Republic of Uzbekistan;
- preparation and implementation of comprehensive measures to develop the infrastructure of the space industry, space research and technology, research and development, experimental design and innovative work;
- organization of training for specialists in higher educational institutions of Uzbekistan in the field of space research and technology, including in leading foreign higher educational institutions, etc.

Experts in the field of space technology are now preparing at the Tashkent state technical university (TSTU) . In TSTU there is a Bachelor's program in “Applied Space Technology” and the master's program in “Applied Space Technology”, in TUIT there is a Bachelor's program in “Mobile connections” and the master's program in “Mobile connections”. Below is an overview of the curricula and Contents of Disciplines of these master's Program.

At present, there are no master's program in “Space systems and communications engineering” in Uzbekistan universities participating in the SPACECOM project.

The curriculum of all master's programs in Uzbekistan consists of four blocks Disciplines. The first block is "General Methodological Disciplines", the second block is "Specialty Disciplines", the third block is "Selective Subjects" and the fourth block is "Scientific Research".

The first block for all specialties is strictly the same, it includes such items as:

- "Strategy of social and economic development of Uzbekistan";

- "Scientific Research Methodology";
- "Pedagogical technologies and pedagogical skills";
- "Applied foreign language";
- "Modern information and communication technologies"
- "Selective Subjects"

№	Item Title	Hours			
		Lecture	Practice	Lab	Self education
1	Innovation and project management	30	-	-	90
2	Research methodology	30	-	-	90
3	Search and retrieve of the information	30	-	-	90
4	Artificial Intelligence and Neural Networks	30	-	-	90
5	Design and analysis of algorithms	30	-	-	90
	TOTAL:	150	-	-	450

In the Master programm “Applied Space Technology” (TSTU) the second unit includes:

- Spacecraft, their systems and equipment;
- Space ballistics and navigation technologies;
- Geoformation technologies;
- Systems for the reception and transmission of space information;
- Processing of satellite images;
- Remote sensing of the earth;
- Application of CAD / CAM / CAE in space projects.

In the Master program “Mobile communication systems” (TUIT) the second unit includes:

- MIMO;
- GSM and mobile communication systems.

The analysis shows that the curricula of these specialties will be useful in developing the curriculum of a new master's degree in the specialty "Space systems and communications engineering".

Of these specialties of the magistracy, such subjects as "Systems for the reception and transmission of space information", MIMO, “GSM and mobile communication systems”, "Application of CAD / CAM / CAE in space projects", etc. can be interconnected.

For completeness, to introduce the program of the new master's program, we studied the master's programs of European partner universities, which contained the following subjects:

- “Digital communications”;

- “Fundamentals of Space Technology”;
- “Satellite Technologies”;
- “Space system design”;
- “Satellite communication»;
- «Applied Project Management for Space System»;
- «Theory of Inventive Problem Solving»;
- «Electronic Design and Assembly of communications systems» ;
- “Celestial mechanics for space mission engineering”;
- “Advanced Microelectronics: design of custom integrated circuits in CMOS technologies for space applications”;
- “Programming Principles & Object Oriented programming”;
- “Development of space-grade embedded systems”;
- “Educational digital tools & blended learning tools for engineering education”;
- “Data protection”;
- “CAD tools for design of systems on chip”;
- “Microelectronics for Information and Communication technologies”;
- “Hot topics in satellite communication system using D-Star technology”.

Analysis shows that the curriculum will contain many new subjects, so we need to take the opportunity to work with European partner universities. Particularly very important will be cooperation in the development of training programs for subjects such as “Fundamentals of Space Technology”, “Satellite Technologies”, “Space system design”, “Hot topics in satellite communication system using D-Star technology” and some others.

Due to the fact that the universities of Uzbekistan have not yet used the credit system for organizing the educational process (only in TUIT, ECTS has been used as an experiment), it is necessary to organize training for teachers on the application of ECTS in partner universities.

Thus, based on an analysis of the master's programs of universities in Uzbekistan, it can be concluded that the experience of European universities is necessary for organizing a master's program in “Space systems and communications engineering”, it is necessary to organize joint development of a master's program in SSCE for organizing the educational process for this program.

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