



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

**ERASMUS +**

**HIGHER EDUCATION – INTERNATIONAL CAPACITY BUILDING**

**Erasmus+ Project**

**New Study Program in Space Systems and  
Communications Engineering  
(SPACE.COM)**

**Invitation to Tender for Equipment Procurement  
(Uzbekistan)**

**#SPACECOM2020**

Dear Sir/Madam,

We kindly invite you to submit your **tender for the supply of Equipment to the project partner universities in Uzbekistan** (see the technical specifications provided in the Part-III of this document) within the framework of the Project “*New Study Program in Space Systems and Communications Engineering*” – (SPACE.COM), co-funded by the **ERASMUS+ Programme of the European Union**.

**The tender will be announced for three laboratories: *Satellite Construction LAB1, Ground Station LAB2 & Additional Equipment*.**

Companies that want to participate in the tendering process for the supply of Equipment for two or all three laboratories must submit a separate commercial offer for each laboratory.

When preparing your tender, please be guided by this invitation to tender.

Tenders should be submitted in English **by Email** to [spacecom.tender@gmail.com](mailto:spacecom.tender@gmail.com) not later than **28.08.2020** (Tashkent local time).

We kindly ask you to ensure that the tender is **signed, stamped, and in the PDF format**. An acknowledgement of receipt will be sent to you accordingly.

In all cases, please add the below reference: **#SPACECOM2020** “Invitation to Tender for Equipment Procurement (Uzbekistan)”.

*For any additional information, please, contact us **only** by Email.*

Dr. Khabibullo Nosirov

[spacecom.tender@gmail.com](mailto:spacecom.tender@gmail.com)

100084, Amir Temur str. 108

Tashkent city,

Uzbekistan

**Contents**

- Part I – Project Description..... 4**
  - 1.2. About SPACE.COM ..... 4
  - 1.2. SPACE.COM Partners – Project Consortium ..... 4
  - 1.3. Disclaimer ..... 5
  
- Part II – Tender Specifications ..... 5**
  - 2.1. Object of the Tender..... 5
  - 2.2. Special Conditions..... 5
  - 2.3. Currency and Language of the Tender ..... 6
  - 2.4. Submission of the Tenders: Means and Deadline ..... 6
  - 2.5. Documents to Be Submitted by the Tenderer ..... 6
  - 2.6. Deadline for Engagement..... 6
  - 2.7. Subcontracting..... 6
  - 2.8. Terms of delivery ..... 7
  - 2.9. Goods Delivery Time ..... 7
  - 2.10. Terms of payment..... 7
  - 2.11. Evaluation and Award of the Contract ..... 8
  - 2.12. Evaluation Committee ..... 9
  - 2.13. Questions, Notification of Results ..... 9
  
- Part III – Bill of Quantities and Technical Specifications..... 10**

## **Part I – Project Description**

### **1.2. About SPACE.COM**

The “New Study Program in Space Systems and Communications Engineering” – SPACE.COM (project reference number 609715-EPP-1-2019-1-UZ-EPPKA2-CBHE-JP) is a three-year duration multi-country joint project co-funded by the Erasmus+ Capacity Building in the Field of Higher Education Programme of the European Union (EU) launched in 2019. The aim of the project is to support the development of New Study Program in Space Systems and Communications Engineering (SPACE.COM) to ensure sustainability of Uzbekistan space systems engineering. The project will create the environment for education of high skilled specialists in line with labor market and according to EU best practices and Bologna process.

These goals will be achieved through fulfilment of the following specific objectives:

1. Development, implementation and accreditation of new practice oriented, student-focused MA program “SPACE.COM” including innovative teaching and learning approaches and ECTS in UZ;
2. Provision of the Higher education institutions (HEIs) in UZ closer to labor market in SPACE.COM area;
3. Increase of the collaboration between EU and UZ HEIs in space technologies area.

### **1.2. SPACE.COM Partners – Project Consortium**

The following institutions (P) from Partner and European countries are involved in the project consortium:

1. Toshkent Axborot Texnologiyalari Universiteti (Tashkent University of Information Technologies named after Muhammad al-Khwarizmi (TUIT)), Tashkent/Uzbekistan
2. Mirzo Ulugbek Nomidagi O'zbekiston Milliy Universiteti (National University of Uzbekistan), Tashkent/Uzbekistan
3. Turin Polytechnic University in Tashkent, Tashkent/Uzbekistan
4. EXOLAUNCH GmbH (formerly known as ECM space technologies GmbH) (EXO), Berlin/Germany
5. Tashkent University of Information Technologies Karshi Branch, Karshi/Uzbekistan
6. Technical University of Sofia, Sofia/Bulgaria
7. Coursento UG, Berlin/Germany
8. Tashkent State Technical University named after Abu Raikhman Beruni, Tashkent/Uzbekistan
9. Fergana Polytechnic Institute, Fergana/Uzbekistan
10. Sorbonne Université, Paris/France
11. Artesis Plantijn Hogeschool, Antwerp/Belgium
12. Technische Universität Berlin (TUB), Berlin/Germany
13. Ulugh Beg Astronomical Institute (UBAI), Tashkent/Uzbekistan
14. Toshkent Axborot Texnologiyalari Universiteti Huzuridagi Pedagog Kadrlarni Qayta Tayyorlash va Ularning Malakasini Oshirish Tarmoq Markazi, Tashkent/Uzbekistan

### **1.3. Disclaimer**

*"This project has been funded with support from the European Commission. This document reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein".*

## **Part II – Tender Specifications**

### **2.1. Object of the Tender**

The consortium announces a tender for the procurement of the equipment to the project partners universities in Uzbekistan (UZ) (see 2.8), within the technical specifications provided in the Part-III of this document.

This document represents an invitation to tender for the supply of computer, multimedia, audio & video and other equipment as part of SPACE.COM Project co-funded by the ERASMUS+ Programme of the European Union.

This invitation to tender is in no way binding on the contracting authority. The contracting authority's contractual obligation commences only upon the signature of the contract with the successful tenderer.

### **2.2. Special Conditions**

1. According to the agreements between EU and the mentioned above project partner countries, all equipment purchased and any provision of services within the framework of Erasmus+ projects is exempted from taxes (including Value Added Tax (VAT)), duties and charges. An appropriate Certificate for the VAT exemption will be provided by the project partners universities – recipients of the equipment (see 2.8).

2. VAT is not considered as an eligible project cost, the commercial offer and later an invoice must not include VAT (“Erasmus+ Programme Guide” of Grant Agreement).

3. In order to be eligible for exemption from the abovementioned taxes (including VAT), duties and charges the equipment procured within this tender should be delivered as CIP Incoterms, as well the seller clears the goods for export and is responsible for delivery of these goods at an agreed place of shipment. (e.g. customs warehouse).

In accordance with the rules approved for equipment supplied to Uzbekistan within the framework of ERASMUS + projects, the selected supplier undertakes to hold by his own forces all procedures related to customs clearance, obtaining the necessary certificates and permissions in state and non-state institutions, pay the required fees for issuing documents of this type, conducting laboratory and other tests, storing and escorting goods on the territory Uzbekistan, fees of customs brokers, porters and other accompanying services.

4. The manufacturer brand of all PC items must be a company that is listed in the rating from Gartner or/and IDC.

5. Certification requirement: ISO 9001 certification of the manufacturer.

6. All participants of a tender procedure agree to provide after the tender MAF (manufacturer authorization form) only on Workstation, AIO and Desktop PC with the name of the project and the competition number to confirm warranty service in the country of delivery. Equipment supplied must have service centers in the country of delivery.

7. It is necessary to provide together with commercial offer links to the sites or datasheets of the manufacturers of all items.

8. Tender Evaluation Committee reserves the right to vary the quantities specified for all lots by +/- 100 % at the time of contracting and during the validity of the Contract. The total value of the supplies may not rise or fall as a result of the variation of the quantities by more than 25 % of the tender price. The unit prices quoted in the tender will be multiplied by the revised quantities procured under the variation.

### **2.3. Currency and Language of the Tender**

The tenders shall be presented in EURO for both the unit prices and the overall amount of the commitment. The currency of payment will be also in EURO. The tenders shall be presented in English.

### **2.4. Submission of the Tenders: Means and Deadline**

Tenders should be submitted in English by Email to [spacecom.tender@gmail.com](mailto:spacecom.tender@gmail.com) not later than **28.08.2020** (Tashkent local time). No offers may be submitted or modified after this date.

We kindly ask you to ensure that the tender is signed, stamped and in the PDF format. An acknowledgement of receipt will be sent to you accordingly.

In all cases, please add the below reference:

#SPACECOM2020 “Invitation to Tender for Equipment Procurement (Uzbekistan)”.

### **2.5. Documents to Be Submitted by the Tenderer**

The tenderer must complete all annexes and provide all information.

Additional documents such as instructions and operating manuals shall be required with the delivery of equipment.

All necessary supporting documents and international certificates required in the country of destination for customs clearance must be provided.

*Companies that want to participate in the tendering process for the supply of Equipment for two or all three laboratories must submit a separate commercial offer for each laboratory.*

### **2.6. Deadline for Engagement**

Tenderers shall remain bound by their tenders for a period of thirty (30) days from the closing date for submission on **28.08.2020** (Tashkent local time).

### **2.7. Subcontracting**

It is prohibited for the tenderers to subcontract parts of the tender to third parties.

## 2.8. Terms of delivery

Term of delivery is customs control point airport in Tashkent, UZ (CIP)

The full addresses and contact details of the responsible persons in partner universities will be provided after the signature of the contract with the selected supplier.

After equipment pass through customs procedures and goods are released to free circulation the selected supplier undertakes to distribute and deliver the equipment to the addresses of recipients, indicated in the table below.

The following 6 (six) universities are involved in this call for tender as the recipients of goods:

No	Partner	Delivery addresses	Acronym	Location
1.	Toshkent Axborot Texnologiyalari Universiteti (Tashkent University of Information Technologies named after Muhammad al-Khwarizmi)	108, Amir Temur street, Tashkent, Uzbekistan	TUIT	UZ/ Tashkent
2.	Mirzo Ulugbek Nomidagi O'zbekiston Milliy Universiteti (National University of Uzbekistan)	4, Universitetskaya street, Tashkent, Uzbekistan	NUU	UZ/ Tashkent
3.	Turin Polytechnic University in Tashkent	17, Small Ring Road street, Tashkent, Uzbekistan	TTPU	UZ/ Tashkent
4.	Tashkent University of Information Technologies Karshi Branch	3km of Beshkent highway, Karshi, Uzbekistan	TUIT	UZ/ Karshi
5.	Tashkent State Technical University named after Abu Raikhman Beruni	2, Universitetskaya street, Tashkent, Uzbekistan	TSTU	UZ/ Tashkent
6.	Fergana Polytechnic Institute	86, Fergana street, Fergana, Uzbekistan	FerPI	UZ/ Fergana

## 2.9. Goods Delivery Time

The delivery period may not exceed 60 days from the date of signature of the contract with the selected supplier.

**\*Some of services can take a bit longer than usual due to the impact of the Covid-19 (Coronavirus) measures. This means the actual delivery period can take even longer, depending on situation.**

## 2.10. Terms of payment

70% prepayment should be made by contract signing, 30% after delivery of the equipment and a final inventory of the equipment at the partner university. Final payment will be made within

two weeks from the submission of a written confirmation from the partner university with the inventory number in the above-mentioned universities (see 2.8).

## **2.11. Evaluation and Award of the Contract**

The key principles that shall govern the process of evaluation of tenders are listed as follows:

- **Non-discrimination:** Any discrimination with regard to tenderers on the basis of nationality is forbidden.
- **Equal treatment:** All tenders submitted within the set deadline are to be treated equally. They will be evaluated on the basis of the same terms, conditions and requirements set in the tender documents.
- **Transparency:** Detailed written records are being kept of all actions of the evaluation panel. All decisions taken will be sufficiently justified and documented. In this way, any discriminatory behaviour can be prevented and if not prevented, then monitored.
- **Confidentiality:** The process of evaluation of tenders is confidential. Information concerning the process of evaluation of tenders and the award recommendation is not to be disclosed to the tenderers or to any other person who is not officially concerned with the process until information on the award of the contract is communicated to all tenderers.

Exclusion criteria: Tenderers are excluded from participation in procurement procedures if:

- they have submitted a tender that does not meet all the requirements provided in this document, including the ones in clause 2.5.
- they are bankrupt or being wound up, are having their affairs administered by the courts, have entered into an arrangement with creditors, have suspended business activities, are the subject of proceedings concerning those matters, or are in any analogous situation arising from a similar procedure provided for in national legislation or regulations,
- they have been convicted of an offence concerning their professional conduct by a judgment which has the force of res judicata,
- they have not fulfilled obligations relating to the payment of social security contributions or the payment of taxes in accordance with the national legal provisions,
- they have been the subject of a judgment which has the force of res judicata for fraud, corruption, involvement in a criminal organisation or any other illegal activity.

In the selection process only will be considered the suppliers who would provide delivery of the equipment to all of the above-mentioned universities (see 2.8).

Selection criteria: tenderers will be selected based on the following criteria:

1. Having submitted the tender that complies with all of the specifications, requirements and offers the lowest price, as well as all other evaluation criteria indicated, shall be selected;
2. Having the necessary economic, financial, technical and professional capacity to perform the contract.

Award criteria: the awarded tenderer will be the one who offered the best quality and price tender out of those submitted by tenderers which are not excluded and which meet the selection criteria.

The awarded tenderer should:

1. Be in full compliance of tender to the tender specifications, bill of quantities and technical specifications;
2. Provided technical information for all the equipment to be supplied.

The contract will be awarded to the tenderer whose tender has been found to be in conformity with the invitation to tender. The award method will be the "best value for money" meaning that the winning tender is the one offering the best quality/price ratio, taking into account the criteria announced in the specifications.

### **2.12. Evaluation Committee**

Tenders will be evaluated by the SPACE.COM Project Tender Evaluation Committee comprising at least 5 (five) members appointed for the purpose.

### **2.13. Questions, Notification of Results**

Participants' questions should be sent no later than 10 days before the deadline for submitting tender proposals by Email to [spacecom-tender@gmail.com](mailto:spacecom-tender@gmail.com) with the reference # **SPACECOM/2020** "Invitation to Tender for Equipment Procurement (Uzbekistan)". Clarifications will be sent within 3 days.

Tenderers will be notified of the results within 10 days from the closing date for submission by email. Thus, it is important to provide the email of the main contact person.

## Part III – Bill of Quantities and Technical Specifications

The following base set **Satellite Construction LAB1** (for 1 University) is planned for procurement within this tender (total 6 sets):

<b>Satellite Construction LAB1: //The table of equipment required for one university</b>		
<b>#</b>	<b>Required Technical Specifications and Standards</b>	<b>Quantity</b>
<b>#1C</b>	<b>Oscilloscope TDS2012</b>	<b>2 pcs</b>
<b>1</b>	<b>Key performance specifications:</b> <ul style="list-style-type: none"> <li>- 100 MHz bandwidth models</li> <li>- 2-channel</li> <li>- Up to 2 GS/s sample rate on all channels</li> <li>- 2.5k point record length on all channels</li> <li>- Advanced triggers including pulse width trigger and line-selectable video trigger</li> </ul>	
<b>2</b>	<b>Key features:</b> <ul style="list-style-type: none"> <li>- 16 automated measurements and FFT analysis for waveform analysis</li> <li>- Built-in waveform limit testing</li> <li>- Automated, extended data logging feature</li> <li>- Autoset and signal auto-ranging</li> <li>- Built-in context-sensitive help</li> <li>- Probe check wizard</li> <li>- 11-language user interface</li> </ul>	
<b>3</b>	<b>144 mm (5.7 inch) active TFT color display</b>	
<b>4</b>	<b>Small footprint and lightweight - only 124 mm (4.9 inches) deep and 2 kg (4.4 lb)</b>	
<b>5</b>	<b>USB 2.0 host port on the front panel for data storage</b>	
<b>6</b>	<b>USB 2.0 device port on the rear panel for connection to a PC or for direct printing to a PictBridge® - compatible printer</b>	
<b>#2C</b>	<b>Oscilloscope TDS2002</b>	<b>1 pc</b>
<b>1</b>	<b>Key performance specifications:</b> <ul style="list-style-type: none"> <li>- 70 MHz bandwidth models</li> <li>- 2-channel</li> </ul>	

	<ul style="list-style-type: none"> <li>- Up to 2 GS/s sample rate on all channels</li> <li>- 2.5k point record length on all channels</li> <li>- Advanced triggers including pulse width trigger and line-selectable video trigger</li> </ul>	
2	<b>Key features:</b> <ul style="list-style-type: none"> <li>- 16 automated measurements and FFT analysis for waveform analysis</li> <li>- Built-in waveform limit testing</li> <li>- Automated, extended data logging feature</li> <li>- Autoset and signal auto-ranging</li> <li>- Built-in context-sensitive help</li> <li>- Probe check wizard</li> <li>- 11-language user interface</li> </ul>	
3	<b>144 mm (5.7 inch) active TFT color display</b>	
4	<b>Small footprint and lightweight - only 124 mm (4.9 inches) deep and 2 kg (4.4 lb)</b>	
5	<b>USB 2.0 host port on the front panel for data storage</b>	
6	<b>USB 2.0 device port on the rear panel for connection to a PC or for direct printing to a PictBridge® - compatible printer</b>	
<b>#3C</b>	<b>Oscilloscope TDS2014</b>	<b>1 pc</b>
1	<b>Key performance specifications:</b> <ul style="list-style-type: none"> <li>- 100 MHz bandwidth models</li> <li>- 4-channel</li> <li>- Up to 2 GS/s sample rate on all channels</li> <li>- 2.5k point record length on all channels</li> <li>- Advanced triggers including pulse width trigger and line-selectable video trigger</li> </ul>	
2	<b>Key features:</b> <ul style="list-style-type: none"> <li>- 16 automated measurements and FFT analysis for waveform analysis</li> <li>- Built-in waveform limit testing</li> <li>- Automated, extended data logging feature</li> <li>- Autoset and signal auto-ranging</li> <li>- Built-in context-sensitive help</li> <li>- Probe check wizard</li> <li>- 11-language user interface</li> </ul>	

3	144 mm (5.7 inch) active TFT color display	
4	Small footprint and lightweight - only 124 mm (4.9 inches) deep and 2 kg (4.4 lb)	
5	USB 2.0 host port on the front panel for data storage	
6	USB 2.0 device port on the rear panel for connection to a PC or for direct printing to a PictBridge® - compatible printer	
<b>#4C</b>	<b>DC Power Supplies Tektronix PWS2721</b>	<b>2 pcs</b>
1	Linear Regulation	
2	Up to 72 V Output Voltage	
3	Output Current-Channel: 0 A to 1.5 A	
4	0.05% Basic Voltage Accuracy	
5	0.2% Basic Current Accuracy	
6	10 mV / 10 mA Programming Resolution	
7	Less than 3 mVp-p Ripple and Noise <ul style="list-style-type: none"> <li>- Ripple and Noise (20 Hz to 7 MHz)</li> <li>- Voltage <math>\leq 1</math> mVRMS / 3 mVp-p</li> <li>- Current <math>\leq 5</math> mARMS</li> </ul>	
8	Bright Display	
9	20 User-defined Setup Memories	
10	Direct Parameter Entry using Numeric Keypad	
11	Power Consumption 350 VA	
12	All cables and connectors must be included	
<b>#5C</b>	<b>Fluke 116 HVAC Multimeter</b>	<b>2 pcs</b>
1	Maximum voltage between any terminal and earth ground: 600 V	
2	Surge protection: 6 kV peak per IEC 61010-1 600 V CAT III, Pollution Degree 2	
3	Display: Digital: 6,000 counts, updates 4 per second	

4	<b>Bar graph: 33 segments, updates 32 per second</b>	
5	<b>Operating Temperature: -10 °C to + 50 °C</b>	
6	<b>Storage Temperature: -40 °C to + 60 °C</b>	
7	<b>Battery type: 9 volt Alkaline, NEDA 1604A/ IEC 6LR61</b>	
8	<b>Battery Life: 400 hours typical, without backlight</b>	
9	<p><b>Accuracy Specifications:</b></p> <p><b><u>DC millivolts:</u></b></p> <ul style="list-style-type: none"> <li>- Range: 600.0 mV</li> <li>- Resolution: 0.1 mV</li> <li>- Accuracy: <math>\pm</math> ([% of reading] + [counts]): 0.5% + 2</li> </ul> <p><b><u>DC volts:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 6.000 V / 0.001 V</li> <li>- Range/Resolution: 60.00 V / 0.01 V</li> <li>- Range/Resolution: 600.00 V / 0.1 V</li> <li>- Accuracy: <math>\pm</math> ([% of reading] + [counts]): 0.5% + 2</li> </ul> <p><b><u>Auto volts:</u></b></p> <ul style="list-style-type: none"> <li>- Range: 600.0 V</li> <li>- Resolution: 0.1 V</li> <li>- Accuracy: 2.0 % + 3 (dc, 45 Hz to 500 Hz) 4.0 % + 3 (500 Hz to 1 kHz)</li> </ul> <p><b><u>AC millivolts<sup>1</sup> true-rms:</u></b></p> <ul style="list-style-type: none"> <li>- Range: 600.0 mV</li> <li>- Resolution: 0.1 mV</li> <li>- Accuracy: 1.0 % + 3 (dc, 45 Hz to 500 Hz) 2.0 % + 3 (500 Hz to 1 kHz)</li> </ul> <p><b><u>AC volts<sup>1</sup> true-rms:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 6.000 V / 0.001 V</li> <li>- Range/Resolution: 60.00 V / 0.01 V</li> <li>- Range/Resolution: 600.0 V / 0.1 V</li> <li>- Accuracy: 1.0 % + 3 (dc, 45 Hz to 500 Hz) 2.0 % + 3 (500 Hz to 1 kHz)</li> </ul> <p><b><u>Continuity:</u></b></p> <ul style="list-style-type: none"> <li>- Range: 600 <math>\Omega</math></li> <li>- Resolution: 1 <math>\Omega</math></li> <li>- Accuracy: Beeper on &lt; 20 <math>\Omega</math>, off &gt; 250 <math>\Omega</math>; detects opens or shorts of 500 <math>\mu</math>s or longer</li> </ul> <p><b><u>Ohms:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 600.0 <math>\Omega</math> / 0.1 <math>\Omega</math></li> <li>- Range/Resolution: 6.000 k<math>\Omega</math> / 0.001 k<math>\Omega</math></li> <li>- Range/Resolution: 60.00 k<math>\Omega</math> / 0.01 k<math>\Omega</math></li> <li>- Range/Resolution: 600.0 k<math>\Omega</math> / 0.1 k<math>\Omega</math></li> </ul>	

	<ul style="list-style-type: none"> <li>- Range/Resolution: 6.000 MΩ / 0.001 MΩ</li> <li>- Accuracy: 0.9 % + 1</li> <li>- Range/Resolution: 40.00 MΩ / 0.01 MΩ</li> <li>- Accuracy: 1.5 % + 2</li> </ul> <p><b><u>Diode Test:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 2.000 V / 0.001 V</li> <li>- Accuracy: 0.9% + 2</li> </ul> <p><b><u>Capacitance:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 1000 nF / 1 nF</li> <li>- Range/Resolution: 10.00 μF / 0.01 μF</li> <li>- Range/Resolution: 100.0 μF / 0.1 μF</li> <li>- Range/Resolution: 9999 μF / 1 μF</li> <li>- Range/Resolution: 100 μF to 1000 μF</li> <li>- Accuracy: 1.9% + 2</li> <li>- Range/Resolution: &gt; 1000 μF</li> <li>- Accuracy: 5% + 20%</li> </ul> <p><b><u>LoZ capacitance:</u></b></p> <ul style="list-style-type: none"> <li>- Range: 1 nF to 500 μF</li> <li>- Accuracy: 10% + 2 typical</li> </ul> <p><b><u>Temperature<sup>2</sup> (Type-K thermocouple):</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: -40 °C to 400 °C / 0.1 °C</li> <li>- Accuracy: 1% + 102</li> <li>- Range/Resolution: -40 °F to 752 °F / 0.2 °F</li> <li>- Accuracy: 1% + 182</li> </ul> <p><b><u>AC μamps true-rms (45 Hz to 500 Hz):</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 600.0 μA / 0.1 μA</li> <li>- Accuracy: 1.0% + 2</li> </ul> <p><b><u>DC μamps:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 600.0 μA / 0.1 μA</li> <li>- Accuracy: 1.0% + 2</li> </ul> <p><b><u>Hz (V or A input)<sup>2</sup>:</u></b></p> <ul style="list-style-type: none"> <li>- Range/Resolution: 99.99 Hz / 0.01 Hz</li> <li>- Range/Resolution: 999.99 Hz / 0.1 Hz</li> <li>- Range/Resolution: 9.999 Hz / 0.001 Hz</li> <li>- Range/Resolution: 50.00 Hz / 0.01 Hz</li> <li>- Accuracy: 0.1% + 2</li> </ul>	
<b>10</b>	<b>All interfaces cables and connectors must be included</b>	
<b>#6C</b>	<b>3D-Printer</b>	<b>1 pc</b>
<b>1</b>	<b>Printing technology: FFF (FDM)</b>	
<b>2</b>	<b>Dimensions, mm: 492 x 390 x 430</b>	

3	Weight, kg: 16	
4	Number of print heads: 2	
5	Supported file formats: stl, plg	
6	Working chamber, mm: 200 x 200 x 210	
7	Frame: steel; Platform: aluminum, glass	
8	Layer thickness, microns, from: 50-200	
9	Accuracy of positioning XY, micron: 11	
10	Accuracy of positioning Z, micron: 1.25	
11	Extrusion temperature, up to, ° C: 380	
12	Platform temperature, up to, ° C: 140	
13	Supported materials: ABS, PLA, FLEX, NYLON, ASA, ABS \ PC, PET, PC, PVA, HIPS	
14	The diameter of the thread, mm: 1.75 ± 0.1	
15	Nozzle diameter, mm: 0.3	
16	Interfaces: USB, USB Flash, Micro SD, Ethernet	
17	Print speed, cm <sup>3</sup> / h, up to: 30	
<b>#7C</b>		
	<i>3D-Scanner</i>	<i>1 pc</i>
1	Industrial colour cameras with 3.1 mpix sensors capture the finest details and curved surface of the object – up to 0.07 mm	
2	Accuracy up to 0.04 mm	
3	Three scanning zones to capture different-sized objects from 1 cm up to 3m	
4	Three scan modes	
<b>#8C</b>		
	<i>HIPS Filament</i>	<i>1 pc</i>
1	Nozzle temperature: 220-240 °C	
2	Bed temperature: 90-110 °C	
3	Diameter: 1.75mm +/- 0.1mm	
4	The net weight of the filament: 750 g	

5	Shrinkage and warping: Minimal to normal	
6	Soluble: Yes, in limonene	
7	Safety warning: Produces toxic fumes during 3D printing	
#9C	<i>ABS Filament</i>	<i>2 pcs</i>
1	Nozzle Temperature: 230 - 260 °C	
2	Bed temperature: 90-110°C	
3	Diameter: 1.75mm +/- 0.1mm	
4	Print Speed: 30 - 70 mm/s	
5	The net weight of the filament: 750 g	
6	Bed Adhesion: PEI sheet, Buildtak, Adhesion spray, ABS juice	

The following base set **Ground Station LAB2** (for 1 University) is planned for procurement within this tender (total 6 sets):

<b>Ground Station LAB2: //The table of equipment required for one university</b>		
#	Required Technical Specifications and Standards	Quantity
#1C	<i>Icom IC-7100 HF/VHF/UHF-Allmode-Transceiver with D-Star DV-Mode</i>	<i>1 pc</i>
1	Intuitive Touch Screen Interface: 48.6 mm x 75.9 mm	
2	HF/50/70/144/430MHz Multi-band, Multi-mode	
3	A high-performance 32-bit floating point IF DSP delivers rich digital signal processing features, including digital IF filter, digital twin PBT, noise reduction, CW auto tune, etc.	
4	DSP Controlled AGC Function Loop	
5	D-STAR DV Mode (Digital Voice + Data)	
6	DR (D-STAR Repeater) Mode Operation	
7	SD Memory Card Slot for Saving Data	
8	Easy Vehicle Mounting with Optional MBF-1	
9	Optional RS-BA1 IP Remote Control Software	
10	Built-in RTTY Functions	

11	<b>CW full break-in, CW receive reverse, CW auto tuning</b>	
12	<b>Optional multi-function microphone, HM-151</b>	
13	<b>RF speech compressor controlled by the DSP</b>	
14	<b>495 regular, 4 call, 6 scan edge and 900 DR mode repeater channels</b>	
15	<b>4 channels TX voice memories</b>	
16	<b>±0.5ppm frequency stability</b>	
17	<b>12kHz IF output for DRM (Digital Radio Mondiale) receive</b>	
18	<b>Straight Forward Operation</b>	
19	<b>Software Keypad</b>	
20	<b>Separate control panel</b>	
21	<b>Controller Mounted Speaker and Jacks</b>	
22	<b>All interfaces cables and connectors must be included</b>	
<b>#2C</b>		
	<b><i>Power Supply to ICOM Transceiver</i></b>	<b><i>1 pc</i></b>
1	<b>External switching power supply unit</b>	
2	<b>13.8 VDC ± 5%, at 25 Amps</b>	
3	<b>Input voltage is 120 VAC (85-135 VAC)</b>	
4	<b>The rear panel has 14 inch output cord with 4-pin plug prewired for the IC-7100, IC-7200, IC-7410 and IC-7600, IC-9100</b>	
5	<b>4.4 x 3.7 x 11.3 inches 6 lbs. 10 oz.</b>	
<b>#3C</b>		
	<b><i>YAESU G-5500 Azimuth/Elevation combination Rotator</i></b>	<b><i>1 pc</i></b>
1	<b>Wind Load: 1,0 m<sup>2</sup></b>	
2	<b>K-Factor: 60 (Turning Radius x Weight of Ae)</b>	
3	<b>Stationary Torque AZ: 4.000 kg/cm</b>	
4	<b>Stationary Torque EL: 4.000 kg/cm</b>	
5	<b>Rotation Torque AZ: 600 kg/cm</b>	
6	<b>Rotation Torque EL: 1.400 kg/cm</b>	
7	<b>Max Vertical Load: 30 kg</b>	
8	<b>Max Vertical Intermittend Load: 100 kg</b>	

9	Backlash AZ: 1°	
10	Backlash EL: 1°	
11	Mast Size AZ: ø 38-62 mm	
12	Mast Size EL: ø 38-62 mm	
13	360° Rotation Time AZ: 70sec @ 50Hz	
14	180° Elevation Time EL: 80sec @ 50Hz	
15	Boom Diameter EL: ø 32-43	
16	Rotator Diameter x Height: ø186 x W254 x H350 mm	
17	Weight: 7,8 kg	
18	Cable Requirement: 2 x 6 (# cores/wires) - 1 for each AZ + EL	
<b>#4C Mast preamplifier 70cm/430-450 MHz 1 pc</b>		
1	Freq Range MHz (MHz): 430 – 440	
2	Insertion Loss (dB): 0.15	
3	Noise Figure (dB): 0.7	
4	Amplification (dB): typ. 12 – 22	
5	Max. Power: Mit Sequencer: 500 (SSB), 300 (FM), mit VOx: 50 W FM	
6	Current Intake (A): 0.320	
7	Max. Power Handling: 500W	
8	Noise Figure: 0.8000	
9	Connector A: N Socket	
10	Connector B: N Socket	
11	Supported Bands: 70cm	
12	Max. Mast Diameter (mm): 58	
13	Adjustable gain, low noise and good large-signal response	
14	Amplifier is built with a GaAs MMIC of the latest technology on high quality microwave substrate in SMD technology	
15	UV-resistant plastic housing	
16	Galvanized mast clamps with stainless steel screws	

#5C	<i>X-Quad Antenna 432 MHz</i>	<i>2 pcs</i>
1	Switchable polarisation possible (hor, vert, circ. right, circ. left, diagonal)	
2	Short boom length and compact overall size	
3	Can be mounted on front of mast or centrally on mast	
4	Weight [kg]: 1.600000	
5	Stacking Distance: 110.0000	
6	Max. Power Handling: 1000W	
7	Number of Elements: 2 x 18	
8	Stacking Distance (cm): 110	
9	Front Back Ratio (dB): 21	
10	Half Power Beam Width (3dB) Vertical: 36	
11	Half Power Beam Width (3dB) Horizontal: 36	
12	Supported Bands: 70cm	
13	Length [m]: 12.7 m	
14	Height [m]: 22 cm	
#6C	<i>Lightning protection N Bu/St 400W</i>	<i>2 pcs</i>
1	Max. Power 500-3000 MHz (W): 400	
2	Insertion Loss 500 MHz (dB): < 0.3	
3	Insertion Loss 1500 MHz (dB): < 0.3	
4	Insertion Loss 3000 MHz (dB): < 0.3	
5	Upper frequency limit (kHz): 3000	
6	Max. Power 30-500 MHz (W): 400	
7	Max. Power 0-30 MHz (W): 400	
8	Breakthrough Voltage (V): 1000	
9	Max. Power Handling: 400W	
10	Connector B: N Socket	
11	Connector A: N Plug	
12	Size W x H x D: 77 x 41 x 21	
13	For in-line use	
14	Can be used in the coax cable directly at the antenna base	

15	M4 thread for connection of a grounding wire	
16	Weight [kg]: 0.110000	
<b>#7C</b>		
	<i>Coaxial Cable 40m</i>	<i>1 pc</i>
1	Highly flexible, low-loss innovative coaxial cable	
2	Use up to 8 GHz	
3	Low-loss PE-LLC dielectric	
4	Gas content of more than 70%	
5	7-wire hybrid inner conductor with aluminum core and welded copper sheath	
6	Double shielding	
7	User-friendly solderless N connector	
8	Low attenuation, ultra-flexible, anti-radiation safe	
9	Can be used up to the microwave range	
10	Diameter: $10.2 \pm 0.2$ mm	
11	Impedance: $50 \pm 2 \Omega$	
12	Attenuation at 1 GHz / 100 m: 13.49 dB	
<b>#8C</b>		
	<i>Coax switch 4fold 2xN 2xPL</i>	<i>2 pcs</i>
1	Solid aluminium case	
2	Available with PL or N connectors (female)	
3	Excellent frequency response up to 600MHz (CO-201)	
4	Max. Power Handling: 1500W	
<b>#9C</b>		
	<i>R&amp;S®FS 300 Spectrum Analyzer</i>	<i>2 pcs</i>
1	Frequency range: 9 kHz to 3 GHz	
2	Frequency counter with 1 Hz resolution	
3	Resolution bandwidths (-3 dB): 200 Hz to 1 MHz	
4	Video bandwidths: 10 Hz to 1 MHz	
5	Displayed average noise level: < -110 dBm, typ. -115 dBm (300 Hz)	
6	Intermodulation-free range: < -70 dBc at -36 dBm input level	

7	SSB phase noise, 10 kHz offset: < -90 dBc (1 Hz)	
8	Level uncertainty: < 1.5 dB, typ. 0.7 dB	
9	Maximum input level +33 dBm	
10	Measurement functions: TOI, TDMA power, frequency counter, noise marker	
11	Display type: 5.4 inch active color LCD	
12	Remote control via USB interface	
13	Detector: peak	
14	High picture refresh rate	
15	Scalar network analysis	
16	Internal memory for settings and traces	
17	Locating EMC weak spots	
18	Ergonomic user interface	
19	All interfaces cables and connectors must be included	
<b>#10C</b>		
<b>HM8118 LCR Bridge/Meter</b>		<b>1 pc</b>
1	Measurement range: 20 Hz to 200 kHz (69 steps)	
2	Basic accuracy: 0.05 %	
3	Measurement rate: up to 12 values/s	
4	Automatic or manual selection of circuit type (serial, parallel)	
5	Measurement functions: L, C, R,  Z , X,  Y , G, B, D, Q, $\Phi$ , $\Delta$ , M, N	
6	Transformer measurement: mutual inductance and ratio - Internal: 0 V to 5 V/0 mA to 200 mA (resolution: 10 mV/1 mA) - External: 0 V to 40 V (bias voltage only)	
7	RS-232/USB dual interface for remote control, optionally IEEE-488 (GPIB)	
8	Fanless design	
9	All cables and connectors must be included	
<b>#11C</b>		
<b>AFG-72005 Arbitrary Function Generator</b>		<b>1 pc</b>

1	<b>Waveforms: Sine, Square, Ramp, Noise, Arbitrary Waveform</b>	
2	<p><b><u>Arbitrary Waveform:</u></b></p> <ul style="list-style-type: none"> <li>- Sample Rate: 20 MSa/s</li> <li>- Repetition Rate: 10MHz</li> <li>- Waveform Length: 4k points</li> <li>- Amplitude Resolution: 10 bit</li> <li>- Non-Volatile Memory: 4k points</li> </ul> <p><b><u>Frequency Characteristics:</u></b></p> <p><b><i>Range</i></b></p> <ul style="list-style-type: none"> <li>- Sine, Square: 0.1Hz - 5MHz</li> </ul> <p><b><i>Resolution</i></b></p> <ul style="list-style-type: none"> <li>- Sine, Square, Ramp: 0.1Hz</li> </ul> <p><b><i>Accuracy</i></b></p> <ul style="list-style-type: none"> <li>- Stability: <math>\pm 20</math> ppm</li> <li>- Aging: <math>\pm 1</math> ppm, per 1 year</li> <li>- Tolerance: <math>\leq 1</math> mHz</li> </ul> <p><b><u>Output Characteristics:</u></b></p> <p><b><i>Amplitude</i></b></p> <ul style="list-style-type: none"> <li>- <b>Range:</b> <ul style="list-style-type: none"> <li>1 mVpp to 10 Vpp (into 50<math>\Omega</math>), 0.1Hz~20MHz</li> <li>2 mVpp to 20 Vpp (open-circuit), 0.1Hz~20MHz</li> <li>1 mVpp to 5 Vpp (into 50<math>\Omega</math>), 20MHz~25MHz</li> <li>2 mVpp to 10 Vpp (open-circuit), 20MHz~25MHz</li> </ul> </li> <li>- <b>Accuracy:</b> <math>\pm 2\%</math> of setting <math>\pm 1</math> mVpp (at 1 kHz/into 50<math>\Omega</math> without DC offset)</li> <li>- <b>Resolution:</b> 1 mV or 3 digits</li> <li>- <b>Flatness:</b> <ul style="list-style-type: none"> <li><math>\pm 1\%</math> (0.1 dB) <math>\leq 100</math>kHz</li> <li><math>\pm 3\%</math> (0.3 dB) <math>\leq 5</math>MHz</li> <li><math>\pm 4\%</math> (0.4 dB) <math>\leq 12</math>MHz</li> <li><math>\pm 20\%</math> (2 dB) <math>\leq 20</math>MHz</li> <li><math>\pm 5\%</math> (0.4 dB) <math>\leq 25</math>MHz</li> <li>(sine wave relative to 1 kHz/into 50<math>\Omega</math>)</li> </ul> </li> <li>- <b>Units: Vpp, Vrms, dBm</b></li> </ul> <p><b><u>Offset:</u></b></p> <ul style="list-style-type: none"> <li>- <b>Range:</b> <ul style="list-style-type: none"> <li><math>\pm 5</math> Vpk AC+DC (into 50<math>\Omega</math>)</li> <li><math>\pm 10</math> Vpk AC+DC (Open circuit)</li> </ul> </li> </ul>	

	<p>±2.5 Vpk AC+DC (into 50Ω) for 20MHz-25MHz  ±5Vpk (Open circuit) for 20MHz-25MHz</p> <ul style="list-style-type: none"> <li>- <b>Accuracy:</b> 2% of setting + 10 mV+ 0.5% of amplitude</li> </ul> <p><b>Output:</b></p> <ul style="list-style-type: none"> <li>- <b>Impedance:</b> 50Ω typical (fixed) &gt; 300kΩ (output disabled)</li> <li>- <b>Protection (main output):</b> Short-circuit protected by overload relay automatically disables main output</li> </ul> <p><b>SYNC Output:</b></p> <ul style="list-style-type: none"> <li>- <b>Level:</b> TTL-compatible into &gt;1kΩ</li> <li>- <b>Impedance:</b> 50Ω nominal</li> <li>- <b>Rise or Fall Time:</b> ≤25ns</li> </ul> <p><b>Sine wave Characteristics:</b></p> <ul style="list-style-type: none"> <li>- <b>Harmonic Distortion:</b>  -55 dBc DC ~ 200kHz, Ampl &gt; 0.1Vpp  -50 dBc 200kHz ~ 1MHz, Ampl &gt; 0.1Vpp  -35 dBc 1MHz ~ 5MHz, Ampl &gt; 0.1Vpp  -30 dBc 5MHz ~ 25MHz, Ampl &gt; 0.1Vpp</li> </ul> <p><b>Square wave Characteristics:</b></p> <ul style="list-style-type: none"> <li>- <b>Rise/Fall Time:</b> ≤25ns at maximum output (into 50Ω load)</li> <li>- <b>Overshoot:</b> &lt; 5%</li> <li>- <b>Asymmetry:</b> 1% of period+1 ns</li> <li>- <b>Variable Duty Cycle:</b>  1.0% to 99.0% ≤ 100kHz  20.0% to 80.0% ≤ 5 MHz  40.0% to 60.0% ≤ 10MHz  50% ≤ 25MHz  (1% Resolution for full Frequency Range)</li> </ul> <p><b>Ramp Characteristics:</b></p> <ul style="list-style-type: none"> <li>- <b>Linearity:</b> &lt; 0.1% of peak output</li> <li>- <b>Variable Symmetry:</b> 0% to 100% (0.1% Resolution)</li> </ul>	
3	<b>Store/Recall: 10 Groups of Setting Memories</b>	
4	<b>Interface: USB(Device)</b>	
5	<b>Display: LCD</b>	
6	<b>Power Source: AC100~240V, 50~60Hz</b>	
7	<b>Power Consumption: 25 VA</b>	

8	<b>Operating Environment:</b> <ul style="list-style-type: none"> <li>- Temperature to satisfy the specification: 18 ~ 28°C</li> <li>- Operating temperature: 0 ~ 40°C</li> <li>- Relative Humidity:  ≤ 80%, 0 ~ 40°C  ≤ 70%, 35 ~ 40°C</li> <li>- Installation category: CAT II</li> </ul>	
9	<b>Operating Altitude: 2000 meters</b>	
10	<b>Storage Temperature: - 10 ~ 70°C, Humidity: ≤70%</b>	
11	<b>All cables and connectors must be included</b>	
<b>#12C Phase line 2m f. X-Quad w. connectors 2 pcs</b>		
1	Combines the two radiators to one cable	
2	For circular polarization	
<b>#13C Power splitter 2 m f. 2 antennas, 2000W 2 pcs</b>		
1	Max. Power Handling: 2000W	
2	Supported Bands: 2m	

The following base set **Additional Equipment** (for 1 University) is planned for procurement within this tender (total 6 sets):

<b>Additional Equipment (for Career Office) //The table of equipment required for one university</b>		
#	Required Technical Specifications and Standards	Quantity
<b>#VCRI Desktop Computer 4 pcs</b>		
1	<b>Form-factor: Pre-built Desktop Computer</b>	
2	<b>CPU not less than Intel i7-9750H 9th Gen (Base Frequency 2.60 GHz / Max Turbo Frequency 4.50 GHz, 12Mb Smart Cache, 35 W)</b>	
3	<b>RAM not less than 16GB DDR4 2666MHz</b>	
4	<b>SSD M.2 not less than 256GB PCIe NVMe</b>	
5	<b>HDD not less than 1000Gb SATA</b>	

6	<b>Graphics Card Nvidia Quadro 4GB GDDR5</b>	
7	<b>PSU according to configuration, 80 Plus</b>	
8	<b>Keyboard USB with Numpad Eng/Russian (Qwerty)</b>	
9	<b>Mouse USB optical</b>	
10	<b>I/O interfaces:</b> <ul style="list-style-type: none"> <li>- <b>Front panel:</b> <ul style="list-style-type: none"> <li>• USB 3.1 ports/Type C</li> <li>• USB 2.0 ports</li> <li>• Audio jacks: front-side Mic/Headset ports</li> </ul> </li> <li>- <b>Rear panel:</b> <ul style="list-style-type: none"> <li>• USB 2.0/3.1 ports</li> <li>• Audio jacks: Headset port</li> <li>• Video output HDMI/DisplayPort</li> <li>• LAN-port Gigabit Ethernet (RJ-45)</li> </ul> </li> </ul>	
11	<b>Screen Size not less than 24" and Resolution Full HD 1080p IPS LED Monitor</b>	
12	<b>Audio: not less than High Definition Audio</b>	
13	<b>Operating System - Windows 10 Professional 64 bit, English, Russian</b>	
14	<b>All interface cables and connectors must be included</b>	
<b>#VCR2</b>	<b><i>Notebook</i></b>	<b><i>2 pcs</i></b>
1	<b>Screen Size not less than 15,6" 1920x1080 Full HD</b>	
2	<b>CPU not less than Intel i7 10th Gen (Frequency up to 3.9 GHz, 8Mb Smart Cache)</b>	
3	<b>RAM not less than 16GB DDR4 2666MHz</b>	
4	<b>SSD not less than 512Gb NVME</b>	
5	<b>Graphic Card with at least 2 GB GDDR5 graphics memory</b>	
6	<b>Keyboard USB with Numpad Eng/Russian (Qwerty)</b>	
7	<b>Webcam not less than HD720</b>	
8	<b>External ports and connectors: USB 3.1, HDMI, Display port</b>	
9	<b>Operating System - Windows 10 Professional 64bit, English, Russian</b>	
10	<b>All interface cables and connectors must be included</b>	

#VCR3	<i>Premium Printer A3</i>	<i>1 pc</i>
1	<b>Epson EcoTank ET-7750</b>	
2	<b>Print method: Inkjet</b>	
3	<b>Available functions: Print, Copy, Scan (A4, A3)</b>	
4	<b>Print Speed: 13 ppm Black / 10 ppm Color</b>	
5	<b>Copy Speed: Black: 10 cpm / Color: 7.2 cpm</b>	
6	<b>Paper Capacity:</b> <ul style="list-style-type: none"> <li>- Upper Cassette: 20 sheets</li> <li>- Lower Cassette: 100 sheets</li> <li>- Rear Feed Slot: 10 sheets</li> </ul>	
7	<b>Interface: USB 2.0 / Ethernet / Wi-Fi</b>	
8	<b>Operating System compatibility - Windows 7, 8.1, 10</b>	
9	<b>Toner cartridge must be included</b>	
10	<b>All interface cables and connectors must be included</b>	
#VCR4	<i>Multifunctional Mono Laser Printer A4</i>	<i>1 pc</i>
1	<b>Canon i-SENSYS MF445dw</b>	
2	<b>Print method: Monochrome laser beam printing</b>	
3	<b>Available functions: Print, Copy, Scan and Fax</b>	
4	<b>Print speed:</b> <ul style="list-style-type: none"> <li>- Single sided: Up to 38 ppm (A4) Up to 63.1 ppm(A5-Landscape)</li> <li>- Double sided: Up to 31.9 ipm (A4)</li> </ul>	
5	<b>12.7 cm LCD touchscreen</b>	
6	<b>Wi-Fi, Application Library, PIN document release</b>	
7	<b>Operating System compatibility - Windows 7, 8.1, 10</b>	
8	<b>Android and iOS compatible</b>	
9	<b>Extra cartridge and drum cartridge must be included</b>	
10	<b>All interfaces cables and connectors must be included</b>	