وكالة الإمارات للفضاء
UAE SPACE AGENCY

United Arab Emirates

BOEING

جامعة خليفة
KHALIFA UNIVERSITY

Call for Proposals

The UAE Space Agency in collaboration with Khalifa University and Boeing Corporation is announcing the UAE Mini Satellite Challenge: Design, Build, and Launch, which will allow students to participate in space-technology development. The winning team will test their technology on a 2U CubeSat platform deployed from the International Space Station. CubeSats are cube-shaped spacecraft (satellites) that are sized in units or U's. A unit U is defined as a volume of about 10 cm x 10 cm x 10 cm and typically weighs less than 1.33 kg. CubeSats have been utilized in numerous science investigation missions that studied Earth's atmosphere, near earth objects, space weather and biological sciences.

Objectives of the Competition:

The UAE Mini Satellite Challenge targets university students. The challenge provides the opportunity for students interested in the fields of engineering, material sciences, physical sciences, etc. to develop technology applications and experiments that are exposed to the space environment and have a clear view of the Earth and universe. The goal is to foster creativity, collaboration, and critical thinking among young innovators bridging the application of technology and the unique environment of space for the advancement of engineering research and development. It aims to spark students' interest in engineering research and development by equipping them with 21st century skills. The challenge will provide hands-on educational experiences in developing aerospace and satellite technologies to the winning team.

The Competition:

The competition will consist of submission of a white paper proposal to design experiment(s) that can solve real-life space exploration problems.

Participants will submit a white paper proposal to design experiments that can solve real-life space exploration problems such as:

- Earth Observation - collecting data on the global climate, environmental change and natural hazards.
- Space Science - cosmic radiation, astrophysics, planetary observation, micro gravity measurement
- Engineering Research and Development – navigation, solar cell technology, communications

No equipment or lab supplies are needed to enter this contest. The winning team of the white paper competition will receive grant funding that will be used to develop the proposed payload idea.

The competition will consist of a Letter of Intent, submission of a white paper proposal, and for the finalists, a 20 minute presentation to a panel of judges. Detailed instructions about LOI and white paper stages of the competition are provided below.

Eligibility:

- The challenge is open to all students enrolled in undergraduate courses at higher education institutions in the UAE.
- It is generally expected to have more than five students in the team. There is no maximum limit on the number of students per team.
- Teams may include one graduate student and this should be clearly indicated in the proposal.
- All teams should include a faculty mentor and at least one UAE national
- The team can be formed with students from a single university or can be combined as consortium of two or more universities.
- A maximum of two teams are allowed per university.

Guidelines:

Letter of Intent (LOI): Interested participants write and submit an abstract (up to 500 words), to contain the following; brief description of their team's payload concept and its scientific value if successful, brief description of home institution and relevant capabilities for payload realization, needs for payload realization not existing at team's home institution, names, contact details and positions of team members including at least 1 academic/faculty advisor to the team.

White Paper (by Invitation only):

Based on judgment of the submitted LOI, only selected teams will be invited to submit a White Paper and will be formally inducted into the UAE Mini Satellite Challenge as Participants. Detailed Instructions for submitting White papers will be sent separately to the invited teams. All the qualified teams will be invited to an introductory workshop on CubeSats to help them with their proposal.

By accepting to participate in the competition, the teams will need to agree to the intellectual property terms of the competition. They are as follows:

1. **For purposes of this competition, the term Intellectual Property shall mean patented and unpatented inventions, mask works, copyrighted works, trade secrets, know-how and Proprietary Information.**
2. **The winning party shall retain full ownership in all Intellectual Properties that were generated or acquired by such Party prior to or independently of this contract (Background IP).**
3. **Should Intellectual Property be generated by the winning team in performing this contract (Foreground IP), then the ownership, use and exploitation of the Intellectual Property generated will owned by the winning team.**
4. **The winning team shall allow the UAE Space Agency royalty-free, non-exclusive, non-commercial use of Foreground IP generated by the competition prize package.**
5. **Should the UAE Space Agency wish to use or exploit any Foreground IP for internal, non-commercial purposes, but such use is dependent upon previously licensed background IP, then the UAE Space Agency and the winning team shall negotiate in good faith the granting of a license in such Background IP on non-commercially reasonable bases.**

Technical Details and Specifications:

After the CubeSat deploys its transmitters turn on and the ground station at Masdar City will listen for its beacons, determine its small satellites' functionality and announce operational status. A CubeSat mission duration and orbital life will vary, but it is anticipated to operate for at least 90 days. Communications from the CubeSat to the Ground Station will be primarily VHF and UHF receive and transmit; S band receive capability can be explored for missions demanding higher data rates.

The payload will be integrated with a standard 2U CubeSat configuration. This platform will be equipped with the following technologies:

1. Attitude Determination and Control System (ADCS)
2. Communication System (COM)
3. Electrical Power System (EPS)
4. On-Board Computer (OBC)

The general information on CubeSat Design Specification and other details can be found at the following link http://www.cubesat.org/resources/

General Restrictions for Payload/CubeSat Development:

- CubeSat shall be passive and self-contained from the time it is loaded into the deployer until it is deployed. Batteries must be drained and cannot charge. No servicing or access to the CubeSat is available on the ground or on ISS.
- CubeSat shall not contain pyrotechnics or propulsion systems.
- CubeSat shall not contain any toxic materials or materials with significant outgassing.
- CubeSat shall not have any detachable parts or generate debris during deployment or operations.
- CubeSat shall wait 30 minutes after deployment from ISS to begin operations and deploy appendages (antenna, etc).

- CubeSat shall not contain liquids or pressurized fluids. CubeSat enclosures shall allow for adequate venting of gases during launch and deployment.
- CubeSat batteries shall meet NASA safety standards (physically contained and with protective circuits). Batteries included in the kit should already meet this requirement; use of additional batteries should be avoided.
- CubeSat should avoid where possible any fragile material. Solar cells are expected to fall into this category but developers should avoid fragile materials elsewhere.

Some of the above are not explicitly forbidden but would require substantial coordination in the design to gain approval. These are outside the scope of capability of a short term university project.

Finalist Presentation (for qualifying teams only):

Following the White Paper judgement, select teams will advance to finalist status and must prepare a presentation, to be given publically, in-person at the UAE-CubeSat Workshop for Finalists event. The presentation should be electronically created and presentable through overhead projection. The presentation should be no longer than 20 minutes.

Timeline

Submission of Letter of Intent	April 29th , 2018
Selection of proposals for next stage	May 6th , 2018
White Paper Submission	June 17th , 2018
Finalist Presentation and Announcement of Winners	August 19th , 2018
CubeSat Project Kick-off	September 1st , 2018

Judging:

The white paper proposals will be evaluated by a panel of academic, commercial, and government experts in space technology and deployment. Criteria for judging will include:

1. Innovation: a central element of the proposed mission must be a line of scientific inquiry, a space flight technology, a destination, or a system that demonstrates a space-business model that is new to the world
2. Feasibility: is the proposed mission practical and can it be developed within a short period of time?
3. Relevance to the space community: how important is this question to the space community?
4. Technical feasibility: can the payload be developed in the UAE?
5. Budget: can this project be built for the amount available?
6. Presentation: overall presentation of the idea
7. Team's Management plan for the payload development

Prize:

1. Grant funding of USD 100,000 to develop the experiment payload and miscellaneous test support equipment.
2. Technical support from Khalifa University on the integration of the payload in a 2U CubeSat for their flight experiment. CubeSat in space communication radio and telemetry data service will be coordinated with operators of the ground station at YahSat Space Lab of Khalifa University.
3. Support for payload deployment and qualification services from Boeing's ISS partner(s)
4. Student winner(s) will participate in a specialized training session provided by Boeing and its partners about the International Space Station.
5. Student/team winner(s) travel and logistics costs for trip to launch site in the USA. Restrictions may apply based on government guidelines.
6. Student winner(s) will participate in a specialized training sessions provided by Khalifa University.

Contact:

For any questions please contact: minisat@kustar.ac.ae