



CUBESAT

CATEGORY

FINAL STAGE RULES
BAKU 2025

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1. Introduction

The CubeSat competition encourages youth and technology enthusiasts to learn and use STEAM knowledge, experiment with space technology, explore the working principles of future technology, and achieve results by developing engineering, design practices, and independent thinking. The goal is to gather knowledge, learn to cooperate, compete and have fun at the same time.

2. Teams

- 2.1.** Teams should consist of 3 people (1 team leader, 2 students).
- 2.2.** The team leader must be over 18 years old, and the students must be between **13-17** years old.
- 2.3.** Each team leader and student can participate in only one team.
- 2.4.** After the end of the registration, a selection round will be held between the teams and the final teams will be determined. The conditions and time of the selection round will be announced after the end of registration.
- 2.5.** Anyone who wants to participate in the competition can join under the conditions and under the condition that they do not deviate from the equipment specified for the preparation of the Satellite (hereafter Sat).

3. Description of the race

- 3.1.** The competition consists of two parts. In the first part, each team will be evaluated by presenting the design and technology of the carrier satellite that will house the CubeSat.



- 3.2.** The size range given here for the model should be in the range of length 70-100cm, width 30-50cm, height 30-50cm.

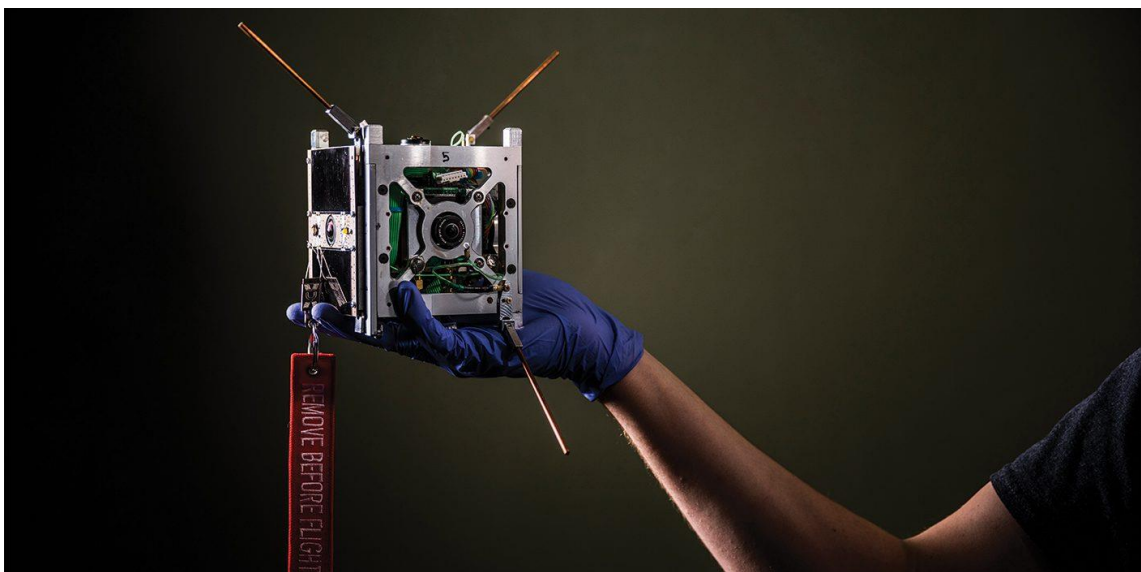
- 3.3.** The satellite model should consist of 3 parts:
- 3.4. Body** - body part should be gold or aluminum color. The fuselage must have space to accommodate the CubeSat.
- 3.5. Wings** – Solar panels should be visible. Both real and photo panels can be used here.
- 3.6. Antenna** - Each model must have at least 1 and at most 3 antenna models.
- 3.7. Note:** The prepared model must be placed on one stand from the central part during the presentation.
- 3.8.** In the second phase, each CubeSat (hereafter Sat) will be lifted up to 6 meters by carrier helium balloons provided by us. Each team must then establish a wireless connection and send the following information:
- Air temperature
 - Moisture value of air
 - Gyroscope (tilt angles along the X, Y and Z axes)
 - GPS coordinates
 - One photo
- 3.9.** The Sat, attached to the carrier helium balloon, must first establish a wireless connection while on the ground, then it will be launched with the start whistle, after sending the data, a command will be given by the judge at the station to release the carrier from the carrier.
- 3.10.** At this time, some of the helium balloons should be released and Sat should fall to the ground with the force of the earth's gravity. A Sat that is damaged during landing can eliminate the problems that have arisen until the next attempt.
- 3.11.** Upon contact with the ground, the time will be stopped and added to the team's score. The team will be given 5 minutes to complete all these tasks.
- 3.12.** The task will be considered incomplete for Sat that does not land within 5 minutes.
- 3.13.** Each team will be given 3 attempts and will be scored individually according to the 5 tasks given in each attempt.
- 3.14.** If the team has completed the first 2 tasks in the 1st attempt and the other tasks have been completed in the next attempts, then the points collected by the team will be collected.
- 3.15.** The team's task completion time will be taken as the average of the total of 3 attempts.

4. The structure of the competition

- 4.1. The dimensions of the Sat to be prepared should be **10x10x10cm**. Sizes smaller or larger than these sizes are not allowed to compete.
- 4.2. The floor of the competition area will be 6x6 meters with tatami.
- 4.3. Carrier helium balloons will be provided by us at the competition area.
- 4.4. During the race, the race is stopped during the technical probes that occur without the control of the team, and the race is continue after the technical fault is resolved.
- 4.5. 5 minutes are given for renting tasks.
- 4.6. After placing their Sat on the carrier, teams must stand outside the red tape.
- 4.7. The data will be checked against real-time values at the time of data visualization.
- 4.8. If any team sends default values with a ready-made template, that team will be disqualified.
- 4.9. Each team's Sat must send data with **at least 1 sensor** and land.
- 4.10. If the Sat is broken during landing, the landing will be considered incomplete.
- 4.11. For wireless connection, 433Mhz, IP, WiFi, SMS and bluetooth connection should be used.

5. Elements required for CubeSat development

- 5.1. **Body**-Can be made from wood and plastic materials using 3D printer or laser cutting with **10x10x10cm** edge points.
- 5.2. This link should be used for the international standard of CubeSat dimensions.
https://upload.wikimedia.org/wikipedia/commons/3/33/CubeSat_Design_Specification_rev_12_-_1U_dimensions.png
- 5.3. At least 1 part of the body must be open so that the inside can be seen. The body part must be fitted to the team's satellite model.



- 5.4. Weight- the movement of the prepared Sat with the helium balloon should be taken into account. For this reason, the maximum weight should be **400 grams**.
- 5.5. There is no limit to the applications used for wireless communication. Recommended software is BLYNK software. <https://blynk.io/home-new>.



- 5.6. When sending information by SMS, it must be sent to the address or mobile number indicated by the judge during the competition. SIM800 module should be used for SMS communication.



- 5.7. Arduino nano(or uno) and ESP modules should be used to calculate operations.



5.8. Arduino nano

Arduino UNO

ESP32 or ESP8266

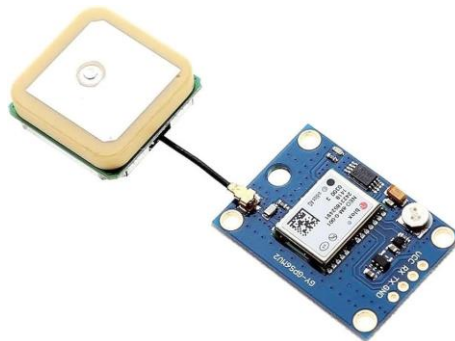
- 5.9.** The ESP32-CAM module must be used to capture or send a photo image, which is the main part of the task.



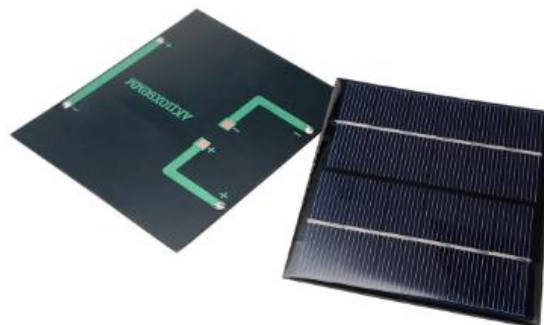
- 5.10.** A DHT11 (or 22) sensor should be used for temperature or humidity values. In addition, it is allowed to use a sensor other than this one.



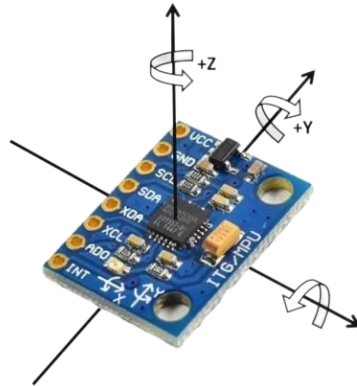
- 5.11.** The most important data information of the objects in the sky are their coordinates in the air. NEO-6M GPS module can be used for this. But other modules are also allowed.



- 5.12.** At least 1 solar panel must be operational on each Sat.



- 5.13. A gyroscope should be used to study the position of an object in the sky relative to the ground. The recommended module here is the MPU6050.



- 5.14. It is free to use other auxiliary electronic modules and equipment.

6. Completion of the task and calculation of points

- 6.1. Each team must use a medical glove during presentation and competition.
- 6.2. When Sat ascends to the sky, it is evaluated with **10** points. Here, we will give you a **500-gram** lifting effect to lift it to the sky.
- 6.3. If the temperature is sent accurately, **10** points will be awarded. If the temperature is close to real, 5 points will be given.
- 6.4. **10 points will be given** if air moisture value is sent. If the moisture value is close to real, 5 points will be given.
- 6.5. **25 points will be given** if the GPS location data is sent, 20 points will be given if the location data is close to reality.
- 6.6. The photo limit is 1 and **10** points are awarded. If the team has taken several photos, they can present the best one to the judge. During the photo, certain numbers will be written in the landing zone and those numbers should be reflected in the picture.
- 6.7. **10 points** each along the X, Y and Z axis. Additional **10 points will be awarded** if 3-axis angles are sent.
- 6.8. Each team must send their team name by SMS. **20 points are awarded** for the team name. In addition, **5 points will be given** for each data sent by SMS.

- 6.9. SAT should be released after the data is sent. In this case, **10** points will be given. Additional **10 points will be awarded** if Sat lands completely on the ground.
- 6.10. The descent of Sat suspended in the air is not counted.
- 6.11. If the weight calculation of the released Sat is not done correctly, the drop that occurs is not calculated.
- 6.12. Each off-mission team can send data using an additional 2 sensors. At this time, **5 points will be given** for each sensor.