

SPOCS Frequently Asked Questions

Eligibility

Can a student who is not a U.S. citizen or permanent resident participate?

Yes; however, only U.S. citizens and permanent residents who are at least 18 years old may attend the launch week experience at a NASA launch site.

Can a college or university outside of the U.S. participate?

No; sponsoring institutions must be U.S. institutions

Can a high school sponsor a team?

No; sponsoring institutions must be higher education (junior college, college, University, etc.)

Can a high school student participate on a team of college students?

Only students enrolled in an institution of higher learning may participate as an official team member. A high school student may work with a team that participates in SPOCS, but as an unofficial team member. An unofficial team member would not be permitted to participate in launch week activities unless they are enrolled in a college or university and at least 18 years old by the date of travel for the launch week (Launch of experiments is anticipated in Spring – Fall 2021)

Proposal, Budget and Citizen Science

How detailed do we need our proposal to be? Are you looking for a full CAD design with a list of individual components?

The reviewers cannot assume anything that is not written in the proposal. Please provide the level of information you feel will be enough for us to review both the scientific merit as well as the feasibility of your experiment.

Within the proposal the itemized list for budgeting includes materials, fabrication, operating, testing and shipping. Is there an exclusion or inclusion for the budget associated with analysis?

The up to \$20,000 subcontract award is for equipment or supplies to build the experiment and perform outreach. You may include analysis in the proposal, but there is no guarantee it will be approved by the

Oklahoma State University Grants and Contracts Office, which will be awarding subcontracting funds, will approve analysis as a reimbursable expense.

Are Facilities and Administration (F&A) costs included in the up to \$20,000 subcontract award to the sponsoring institution?

The up to \$20,000 subcontract award includes F&A. The sub-awardee may choose to voluntarily waive their F&A in an effort to further the program costs and meet their requirements under the agreement or they may have to reduce their Statement of Work if costs exceed \$20,000.

For the citizen science plan, is the high school students involvement limited to the data analysis?

The expectation for citizen science is to involve K-12 students in a meaningful way. This can be data analysis, but is not limited to data analysis. As a reminder, the proposal requires a “detailed plan to involve K-12 students as co-experimenters.” We want to see K-12 students involved in whatever part of the science experiment you feel works best, not just recipients of outreach activities.

Nanolab Specifications

What is the thickness of the walls (or internal dimensions) of the Nanolab?

More details on this will be provided after selection via the Interface Definition Document (IDD). Generally plan for outer dimensions of 10x10x15 cm.

What type of closure/seal does the Nanolab have?

More details on this will be provided after selection via the Interface Definition Document (IDD). Please keep in mind that the Nanolab never counts as a level of containment.

Is the Nanolab airtight and/or does it have gas permissibility? If an experiment produces a gas byproduct such as methane, can it be off-gassed or must it be contained within a chamber designed within the Nanolab?

The Nanolab is not airtight, and teams should design their experiment with the knowledge that the Nanolab is a dimensional constraint, not a level of containment. In other words, the teams will still need to design their experiment within the Nanolab for 2 levels of containment. If there is a concern that outside gas (air) may affect the experiment, then the internal components should be designed to be airtight. Additionally, gas cannot permeate outside the experiment enclosure and therefore must be contained within. Furthermore, significant pressure buildup will not be permitted, and the amount permitted will be dependent on the context/design of the experiment as a whole.

Power, Data, Connection and Control

What type of USB connection will we have? We would like to know how much power will be provided to our module.

Specific USB connector information will be provided after selection. The power provided will be a 5V connection at 900 mA.

When will the experiment be begin to receive power through the Nanode platform connection?

Payloads will not receive power until it is plugged in on the International Space Station. Currently, that occurs within 24 hours after the visiting vehicle berths to the space station, if science requires. In total, there is a maximum of 7 days total from handover to the payload being powered on the station for time-critical science. Noncritical payloads are activated as crew time allows and as necessary for the duration of the science.

Will Nanoracks provide our data recording?

Nanoracks can downlink data during prescribed command windows and e-mail or transfer the resulting data file to student teams.

What data downlink rate will be available over the USB connection?

There are a number of factors that impact the data downlink rate. Feel free to let us know if there are specific concerns.

Will students have the ability to activate send payload commands to our experiments on the space station?

Nanoracks is able to control the payload with inputs from the customer, which is done through Nanoracks' command BRIDGE in Houston. In other words, while the customer does not have direct access to the payload, they are able to provide inputs to the Nanoracks ops team.

Does NASA/International Space Station provide vessel/software control in any form? How is vessel control supposed to be established?

Nanoracks operations conducts data uploads and downloads using inputs from the teams during the payload's duration of operation on the Space Station. Nanoracks, nor NASA, nor the ISS provides software for the payload.

Is there a chance for an astronaut to push a button to initiate the experiment at the beginning or are no interactions at all allowed?

The Nanolab will be plugged into a frame, and Nanoracks' ops team can upload code provided by the team to interact with the experiment. As such, teams should design their experiment so that as soon as it the Nanolab receives power, it turns on. Teams are responsible for software design.

Is there a form of hardware control provided or does hardware and software control need to be established by the proposing team?

Nanoracks provides the enclosure for the experiment, with a USB 2.0 connection for power/data. The team members will be responsible for designing the hardware enclosed within the Nanolab.

Experiment Limits

Is there a mass budget?

Approximately 1500 grams, but this is flexible.

Is there a restriction on temperature for the experiment?

Yes, the outer surface of the Nanolab can never exceed 45 C (113F).

What is the temperature regulation of the space where the Nanolab will be/inside of it?

No temperature regulation is provided inside of the Nanolab. The Nanolab will be stored at approximately ambient temperature and pressure while traveling to and from the International space station as well as while it is on the space station. Some heat dissipation is provided by the Nanode frame that the Nanolab is contained within, but teams should not depend on this for heat management.

What are the post-experiment preservation methods available? Can it be frozen?

Freezing would levy a massive amount of testing on a Nanolab team. Nanoracks will recommend selecting away from proposals requesting freezing.

Do experiments need to use all 30 days they are on the space station?

No. 30 days is the average amount of time an experiment will spend on the International Space Station due to the amount of time the SpaceX Cargo Dragon is docked to the station. Your team will determine how much time is needed within that limit and will start and stop the science clock accordingly.

Bacteria Questions

How do you recommend teams working with bacteria ensure their bacteria remains alive and in the proper configuration for the payload during the transition time from experiment handover to time on the space station?

It is possible to accommodate a request for late-load where samples and materials would be sent directly to Kennedy Space Center and could be kept frozen up until the point of loading. Additionally,

while protocols may vary depending on the biological samples, there could be chemicals, etc. that can be used to keep bacteria alive. We recommend that teams thoroughly research and test the biological materials, bacteria, etc. that they use to determine the temperature requirements necessary.

If we are concentrating on a bacteria payload, how many vessels or number of replicates are we allowed to store in the 1.5U Nanolab dimensions? Or is the experiment limited to a one single vessel?

The limit on the number of replicates allowed will depend on the specific materials used. If they are hazardous (BSL 2), there may be a limit to how much they can have.

Is there any restriction on bacteria species?

Yes, nothing will be permitted that is rated over bio health hazard of 2M, nor nothing with or greater than a Toxicity Hazard of level 2.