
Space Dynamics
LABORATORY

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UNIVERSITY
NANOSATELLITE
PROGRAM

Space Dynamics Laboratory (SDL) Request for Proposals for the Government Fiscal Year (GFY) 2022 NS-11 University Nanosatellite Program (UNP)

Request for Proposals

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DOCUMENT NUMBER: SDL/21-1998
REVISION: -
DATE: 9 AUG 2021

DOCUMENT REVISION HISTORY

Revision	Date	Description of Changes	Revised By
-	08/09/2021	Original Release	-

TABLE OF CONTENTS

1. Introduction.....	1
2. Funding Opportunity Description.....	1
3. Award Information.....	2
4. Eligibility	3
5. Application and Submission Information	3
5.1 Content and Format of Application Submission.....	3
5.1.1 Proposal Format	3
5.1.2 Electronic Submission	3
5.1.3 Contact Information	3
5.2 Proposal Outline.....	3
5.2.1 Abstract.....	3
5.2.2 Project Narrative	3
5.2.3 Statement of Objectives	4
5.2.4 Impact	4
5.2.5 Research Effort	4
5.2.6 Senior/Key Personnel Profile.....	4
5.2.7 Facilities.....	4
5.2.8 Equipment.....	5
5.2.9 Research Budget Request	5
5.2.10 Milestone Schedule.....	5
6. Application Review	5
6.1 Evaluation Criteria.....	5
6.2 Review and Selection.....	6
6.3 Award Notices	6
7. Deliverables	6

Space Dynamics Laboratory (SDL) Request for Proposals (RFPs) for the Government Fiscal Year (GFY) 2022 University Nanosatellite Program (UNP) Nanosat-11

1. INTRODUCTION

The Space Dynamics Laboratory (SDL), in support of the Air Force Office of Scientific Research (AFOSR) and the Air Force Research Laboratory, Space Vehicles Directorate (AFRL/RV), announces a GFY 2022 competition for research to promote and sustain university research and education focused on small satellites and related technologies. Eligible and interested universities are encouraged to submit a proposal in accordance with the criteria in this RFP. The AFOSR manages the basic research investment for the U.S. Air Force (USAF) and Space Force (USSF). As a part of the AFRL, AFOSR's technical experts foster and fund research within the AFRL, universities, and industry laboratories to ensure the transition of research results in support of USAF needs.

Founded in 1999, the University Nanosatellite Program (UNP) is a federally-funded research program funding small satellite projects at U.S. Universities. The current RFP represents the 11th round of the program – Nanosat-11 (NS-11). The intention of the program is two-fold: to provide systems engineering training to students to prepare them for the industrial workforce and to develop small satellite expertise at U.S. universities. The UNP is part of the President's STEM education portfolio and is monitored by the National Science and Technology Council as mandated under the America Competes Reauthorization Act of 2010.

In support of AFRL and AFOSR, SDL is seeking unclassified, fundamental research proposals that do not contain proprietary information. It is expected that multiple awards will be made.

SDL will not issue paper copies of this announcement. SDL and the sponsoring Government agencies involved in this program reserve the right to select and award contracts for all, some, or none of the proposals received in response to this announcement. SDL shall provide no funding for direct reimbursement of proposal development costs. No material submitted in response to this request for proposal will be returned.

2. FUNDING OPPORTUNITY DESCRIPTION

The objective of the UNP is to promote and sustain university research and education focused on small satellites and related technologies. The primary outcome of individual projects funded under this program is the design, fabrication, and functional testing of a small satellite.

Secondary objectives are to foster research in enabling technologies for small satellites and the design of experiments that can be performed by small satellites in orbit.

Initial awards will be for a 2-year period and include educational and program review activities offered by SDL, AFRL/RV and AFOSR. At the end of the project period, a milestone review will be held to identify the small satellite(s) that have displayed the ability for space launch and operation. SDL, AFRL/RV, and AFOSR will work with selectees who progress into a second phase of NS-11, which will promote the space-worthy design and fabrication in preparation for a potential launch.

Teaming by a maximum of two universities is an acceptable option. The team of universities will share, as a team, the constraints of a single entry into the small satellite program, thereby splitting available design space and funding between team members. Each such proposal should detail the overall team objectives and the role of each university. One institution should be indicated as the primary Point of Contact (POC) for team operations.

The following is a list of small satellite research areas of interest. Please note that the list is by no means comprehensive. Proposers are encouraged to propose innovative technologies or experiments not included below.

1. Enabling technologies in advancement of the small satellite platform
2. Small satellite communications (improved performance, reduced size, weight, and power (SWaP), path agnostic communications, etc.)
3. Enabling technologies in advancement of formation flying
4. Satellite distributed network technologies including but not limited to: space-ground networks, improved cyber security, enhanced cryptography especially for mesh networks
5. Laser communications and associated capabilities
6. Autonomy (operations, decision making, image/event recognition)

For this program, the term “small satellite” will be used to indicate satellites conforming to the CubeSat form factor. Satellites may be in the CubeSat class of 1U, 2U, 3U, 6U, or 12U. These restrictions have been chosen to maintain a focus on small satellites, to keep project workload and costs reasonable, and to facilitate the potential launch of the small satellite.

The performance of research funded by this announcement is expected to be fundamental, as defined by DoD Directive 5230.24 and DoD Instruction 5230.27 define, which describe contracted fundamental research in a DoD context as follows:

“Contracted Fundamental Research. Includes [research performed under] grants and contracts that are (a) funded by budget Category 6.1 (“Research”), whether performed by universities or industry or (b) funded by budget Category 6.2 (“Exploratory Development”) and performed on-campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the 6.2-funded effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense, and where agreement on restrictions have been recorded in the contract or grant.”

3. AWARD INFORMATION

It is anticipated that SDL will issue Fixed Price Level-of-Effort subcontracts to universities. It is anticipated that each project will be funded at a minimum of \$55,000 per year for two years. This will take the participating universities through Phase A of the Nanosat-11 program effort.

It is anticipated that funding will be awarded on an annual basis.

4. ELIGIBILITY

This competition is open only to, and full proposals are to be submitted only by, U.S. institutions of higher education (universities), including DoD institutions of higher education, with degree-granting programs in science and/or engineering.

5. APPLICATION AND SUBMISSION INFORMATION

This announcement may be accessed from the Internet at <http://universitynanosat.org>. See “Electronic Submission” in Section 5.1.2.

5.1 CONTENT AND FORMAT OF APPLICATION SUBMISSION

5.1.1 Proposal Format

The required full proposal format is as follows:

- Paper Size - 8.5 x 11 inch
- Margins - 1 inch
- Spacing - single or double spaced
- Font - Times New Roman, 12 point
- Page Limit - no more than twenty (20) single-sided pages of program description
 - Pages in excess of the page limit will not be evaluated.
- NOTE: Budgetary information is not included in the 20 page limit.

5.1.2 Electronic Submission

Proposals must be received in .pdf format at <http://universitynanosat.org/solicitation> by 4:00 PM, EDT, 1 October 2021.

Late proposals will **not** be considered for this UNP cycle.

5.1.3 Contact Information

Please submit any comments or questions about a technical research area or the procedures for submission of a proposal, along with your contact information (name, university, email, phone number), to info@universitynanosat.org.

5.2 PROPOSAL OUTLINE

5.2.1 Abstract

Include a concise (not to exceed 500 words) abstract that describes the research objective, technical approach, anticipated outcome and impact of the specific research. In the header of the abstract, include the principal investigator and name of university.

5.2.2 Project Narrative

Clearly describe the research, including the objective and approach to be performed, keeping in mind the evaluation criteria listed in this announcement. Also briefly indicate whether the

intended research will result in environmental impacts outside the laboratory, and how the proposer will ensure compliance with environmental statutes and regulations.

5.2.3 Statement of Objectives

Describe the actual research to be completed, including goals and objectives, on one page entitled "Statement of Objectives." Active verbs should be used in this statement (for example, "conduct" research into a topic, "investigate" a problem, "determine" to test a hypothesis). This section should not contain proprietary information.

5.2.4 Impact

Clearly describe the expected impact of the research on the university, the appropriate field of science or engineering, and/or the DoD. Additionally, address the transformative potential of the research on current technologies, systems, methods, approaches, etc. The benefit(s) to the DoD and the ability of the basic (6.1) research to be transitioned to applied (6.2) research may be addressed in this section as well.

5.2.5 Research Effort

Describe in detail the research to be performed. State the objectives and approach and their relationship to comparable objectives in progress elsewhere. Additionally, state knowledge in the field and include a bibliography and a list of literature citations. Discuss the nature of the expected results. The adequacy of this information will influence the overall evaluation. Proposals for renewal of existing support must include a description of progress if the proposed objectives are related.

5.2.6 Senior/Key Personnel Profile

The principal purpose of the requested information is for evaluation of the qualifications of those persons who will perform the proposed research. For the principal investigator and each of the senior staff, provide a short biographical sketch and an abbreviated list of significant publications (vitae).

List the estimate of time that the principal investigator and other senior professional personnel will devote to the research. This shall include information pertaining to other commitments of time, such as sabbatical or extended leave; and proportion of time to be devoted to this research and to other research. Awards may be terminated when the principal investigator severs connections with the proposing organization or is unable to continue active participation in the research. State the number of graduate students for whom each senior staff member is responsible. If the principal investigator or other key personnel are currently engaged in research under other auspices, or expect to receive support from other agencies for research during the time proposed for AFOSR support, state the title of the other research, the proportion of time to be devoted to it, the amount of support, name of agency, dates, etc. Send any changes in this information as soon as they are known.

5.2.7 Facilities

Describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense.

5.2.8 Equipment

List special test equipment or other property required to perform the proposed research. Segregate items to be acquired with award funds from those to be furnished by the Government. When possible and practicable, give a description or title and estimated cost of each item. When information on individual items is unknown or not available, group the items by class and estimate the values. In addition, state why it is necessary to acquire the property.

Justify the need for each equipment item include the proposed life expectancy of the equipment..

5.2.9 Research Budget Request

Estimate the total research project cost. Categorize funds by year and provide separate annual budgets for each project year. The budget proposal should include a budget justification for each year, clearly explaining the need for each item.

5.2.10 Milestone Schedule

Provide a milestone schedule over the 24-month period of performance that aligns with the following nominal Nanosat-11 program schedule.

- Award Announcement Nov 2021
- Kickoff Meeting Jan 2022
- System Concept Review Feb 2022
- System Requirements Review Spring 2022
- Program Management Review 1 Summer 2022
- Preliminary Design Review Winter 2022
- Program Management Review 2 Summer 2023
- Critical Design Review Fall 2023
- Flight Selection Review Jan 2024

6. APPLICATION REVIEW

6.1 EVALUATION CRITERIA

Proposals will be evaluated under three principal selection criteria, of equal importance, as follows:

1. Technical merits of the proposed research and development
2. Potential relationship of the proposed research and development to DoD objectives (Ref. Section 2 - list of small satellite research areas of interest)
3. Educational impact (both undergraduate and/or graduate) of the project

Other evaluation criteria used in the technical reviews, which are of lesser importance than the principal selection criteria are:

1. Experience of key personnel

The technical and cost information will be analyzed simultaneously during the evaluation process.

6.2 REVIEW AND SELECTION

Proposals submitted under this announcement will be evaluated by a scientific review process involving personnel at SDL, AFRL, AFOSR, and/or by outside evaluators retained by AFRL or AFOSR. Employees of commercial firms under contract to the Government may be used to administratively process proposals. These support contracts include nondisclosure agreements prohibiting their contractor employees from disclosing any information submitted by other contractors.

Full proposals will be selected on a competitive basis by a panel of experts from SDL, AFRL and from external entities after consideration of the recommendation of the scientific reviews.

6.3 AWARD NOTICES

Should your proposal be selected for award, the principal investigator will receive a letter from SDL stating this information. This is not an authorization to begin work. Your business office will be contacted by the SDL contracting officer to negotiate the terms of your subcontract.

7. DELIVERABLES

Required reports are: annual and final technical reports (first year technical deliverable is the PDR package, second year technical deliverable is the FSR package), financial reports, and final patent reports. Copies of publications and presentations should be submitted.

The University Nanosatellite Program guides each of the student teams through the satellite analysis, design and build process according to the Milestone Schedule in Section 5.2.10. Appropriate satellite design deliverables packages are associated with each of these major reviews.