

2023 SIF Disbursement Application Form

Name of Organization: Caltech Cubesat Club

Club Bursar's Account Number: C00091222

Point of Contact: Hannah Rose (hrose@caltech.edu)

Club Officers:

- *President:* Turner Bumbary (tbumbary@caltech.edu)
- *Sub-Team Lead:* Saren Daghlia (sdaghlia@caltech.edu)
- *Sub-Team Lead:* Michael Gutierrez (magutier@caltech.edu)

Amount Requested: \$15,000

Will you accept partial funding? Yes

Reason for Requesting Funding:

We wish to begin testing with space-grade cubesat hardware, in preparation for a cubesat launch. We additionally desire funding for a high altitude balloon to launch the science payload we developed this year to practice mission operations (communications, coordination, analysis).

1. List of items to be purchased

Caltech CubeSat Club - Projected Purchases					
Component	Name	Qty.	Unit Price	Total Price	Link
Cubesat Base	Pumpkin Cubesat Kit	1	\$11,500.00	\$11,500.00	Vendor Website
Flight Computer	Eagle Pro Weather Balloon Kit	1	\$ 899.00	\$ 899.00	Vendor Website
Helium Rental	150 Cubic Feet	3	\$ 300.00	\$ 900.00	Vendor Website
Microcontroller	Adafruit Feather M0	5	\$ 19.55	\$ 97.75	Vendor Website
Sum				\$ 13,396.75	
10.25% Tax				\$1,373.17	
Total				\$14,769.92	

2. Description of organization:

The Caltech CubeSat Club has the following three goals:

- To provide opportunities to learn about spacecraft and mission design/operations by DOING.
 - We are going to have physical flight-grade hardware that we can hold in our hands (while wearing proper ESD protection of course) and possibly be preparing to launch it into orbit.
 - We are going to scratch-build a ground station antenna and software system to collect data from real satellite passes in order to learn both the low-level signal processing concepts and the high-level mission operation concepts.
- To foster a cross-disciplinary mindset
 - EE (electronics)
 - ME (hardware design)
 - CS (building robust onboard software and ground station command and control software)
 - Physics (designing mission science deliverables)
 - BEM (applying for funding/sponsorship)
- To provide networking opportunities and give members a chance to learn from field experts @ JPL, GALCIT, etc.

3. List of active members:

- Sarah Bass
- Ruth Berkun
- Turner Bumbary
- Saren Daghlia
- Sam Foxman
- Miles Gee
- Michael Gutierrez
- Makoa Inciong
- Joahan Castaneda Jaimes
- Nathan Ng
- Tyler Nguyen
- Krishna Pochana
- Sophie Polidoro
- Hannah Rose
- Bram Schork
- Kristi Sevier
- Jaylen Shawcross

These members were active throughout the 2022-2023 academic year and helped contribute to projects on three subteams: mechanics, electronics, and avionics/communications.

4. List of club-sponsored activities for 2022-2023

- Club kickoff meeting 10/17/23 (approx. 25 people)
 - introducing / onboarding new members to the club and explaining the project goals for the year.
- Team collaboration sessions (avg 2/week, 6 people/session)
 - spanning fall term into the beginning of winter term to work towards assembling a payload for a high altitude balloon launch



Fig 1: Members of the mechanics subteam using the TechLab 3D printers



Fig 2: Krishna and Turner building payloads in the CubeSat club's room



Fig 3: Members inflating the balloon for launch day!

5. Financial statement for the 2022 fiscal year:

- \$1,500 ASCIT Club Funding
- [Expense tracking spreadsheet](#) (2022 portion of 2021-2022 school year)
- Bursar Refund Request Forms (Fall 2022)
 - [Club Refund Request 1](#)
 - [Club Refund Request 2](#)

6. Budget and activity plan for 2022-2023:

Activity Plan:

- Build a community of students who are passionate about space science, and who want to start doing it now!
- As a precursor to designing and launching a spacecraft mission, we want to design and launch a high-altitude balloon with a cubesat-like science payload. We did a proof of concept for this last year, and we have several ideas to improve it.
- Contribute to the restoration of the Moore Lab Radio Antenna and retrofit it with a satcom band transceiver so that it can also be used as a ground station. This would be in collaboration with Prof. Michael Roukes' class, Ph / APh / EE 118c – Physics of Measurement: Moonbounce and beyond (Microwave scattering for communications and metrology).
- Design a CubeSat mission, plan out the development roadmap as a team, apply for NASA's CubeSat Launch Initiative (or other launch funding source).
- Begin writing software for / testing components with the Space-Capable Cubesat core (Pumpkin CubeSat Kit).
- Document our work and findings to allow for future development.

Budget:

- The Caltech CubeSat Club was awarded approximately \$5,000 during the 2022-2023 academic school year with \$3,500 coming from the Housner Fund and \$1,500 coming from ASCIT club funding.
- The CubeSat Club has some physical lab assets including:
 1. A Lab space/mission operations center
 2. A 2 meter antenna and software-defined radio components
 3. Workstation computers
 4. Arduinos/raspberry Pis
 5. Science sensors, etc.