LATIN AMERICAN SPACE CHALLENGE

Satellite Challenge
Standards Manual (SCSM)

2024 Latin American Space Challenge
Edition 6 | Revision 1

The electronic version is the official, approved document.
Ensure you are using the correct version before proceeding.

LATIN AMERICAN
SPACE
CHALLENGE

Table of Contents

Record of Revisions

The Satellite Challenge Standards Manual (SCSM), previously known as the LASC Rules & Requirements Document, has been revised to streamline the documentation system by consolidating information into a single document. As a result, the rules and requirements for mission organization, as well as the technical specifications for the satellite projects, are now available in this document. The following table records all revisions of the document since the first Latin American Space Challenge.

Edition Number	Revision Number	Issue Date	Effective Date
1	N/A	N/A	N/A
2	2	February 2020	February 2020
3	1	July 2021	July 2021
4	1	January 2022	January 2022
5	2	January 2023	May 2023
6	1	June 2024	June 2024

SCSM Sixth Edition

The following table describes changes contained in Edition 6 of the Satellite Challenge Standards Manual (SCSM Ed. 6). The table describes significant changes and individual changes in each of the SCSM sections and provisions.

SCSM 6 Revision 1 Highlights	
Area(s) of Change	**Description(s)**
All Document.	Baseline of the 2024 LASC Satellite Challenge Standards Manual, including the new LSARP concept of provisions to be followed by participating teams.

Introduction

1. Purpose

The Latin American Space Challenge (LASC) Satellite Challenge Standards Manual (SCSM) is published to establish the standards, guidelines, and operational protocols necessary for participants to effectively engage in the LASC Satellite Challenge.

This manual serves as the definitive reference for teams preparing for and participating in the competition, outlining the criteria and practices to be followed during the design, development, assembly, integration, and potential launch & recovery of the satellite project.

The LASC SCSM serves as the primary framework for evaluating and assessing the technical and operational aspects of entries submitted to the LASC. It provides a structured approach for participants to align with industry best practices in space engineering and mission planning.

2. Structure

The LASC SCSM is organized as follows:

- Section 1 → Satellite Challenge (SAT);
- Section 2 → Mission Organization (ORG);
- Section 3 → Safety (SAF);
- Section 4 → General Requirements (GEN);
- Section 5 → CubeSat Requirements (CUB);
- Section 6 → CanSat Requirements (CAN);
- Section 7 → PocketQube Requirements (PQB);
- Section 8 → Satellite Structure and Materials (SSM);
- Section 9 → Electronic Power System and Communications (ECS);
- Section 10 → Recovery System (REC).

Each section in this Manual is assigned an associated 3-letter identifier (in parentheses above). The reference number for every standard or recommended practice within a section includes the specific 3-letter identifier for that section (e.g., SAT 1.1.1).

3. Sources for LASC Standards and Recommended Practices (LSARPs)

The specifications and standards outlined in reputable aerospace guidelines and industry best practices form the primary sources for the LASC Standards and Recommended Practices (LSARPs). These encompass a wide range of criteria, extending to various aspects of design, engineering, and operational management.

The LSARPs draw upon established principles from recognized aerospace entities, technical publications, and regulatory frameworks relevant to space engineering and mission planning.

The sources of reference and benchmarking includes, but are not limited to the Intercollegiate Rocket Engineering Competition (IREC) or Spaceport America Cup (SA Cup), the European Rocketry Challenge (EuRoC), Friends of Amateur Rocketry - Oxidizers Uninhibited Tournament (FAR-OUT), the Launch Canada Challenge, the IATA Operational Safety Audit (IOSA) program, the Manual de Segurança e Boas Práticas para Operação e Lançamento de Foguetes Amadores by the Brazilian Space Agency (AEB), and the NASA System Safety Handbook.

Additionally, the following standards and manuals were consulted as benchmarks for the Satellite Challenge rules: European CanSat Competition, PocketQube Standard by Alba Orbital, the CubeSat Design Specification by Cal Poly (SLO), and NASA's CubeSat Launch Initiative.

4. Explanation of LSARPs

LSARPs in this manual are designed for use within the Latin American Space Challenge (LASC) and provide the criteria for evaluations. LSARPs are not regulations.

LSARPs Identifiers

All provisions in the SCSM (i. e. the LSARPs) are marked with an identifier consisting of a three-letter section abbreviation and a series of three numbers separated by two decimal points (e.g., ORG 1.1.1).

Maintaining stable LSARPs identifiers is crucial for user convenience among teams, judges, and others, and for maintaining accurate statistical data. Therefore, efforts are made to minimize renumbering of LSARPs when revising the RCSM.

Standards

LASC Standards are specified systems, policies, programs, processes, procedures, plans, sets of measures, components, types of equipment or any other aspect under the scope of LASC that have been determined to be a necessity, and with which a team will be expected to be in conformity during the evaluation process.

Standards always contain the word "**_shall_**" (e.g., "The team **_shall_** have a process...") in order to denote that conformance by a team being evaluated is a requirement for LASC Launch and Recovery Approval.

Recommended Practices

LASC Recommended Practices are specified systems, policies, programs, processes, procedures, plans, sets of measures, components, types of equipment or any other aspects under the scope of LASC that have been determined to be desirable, but conformance is optional by a team.

Recommended Practices always contain the word "**_should_**" or "**_must_**" (e.g., "The team **_should_** have a policy...") to denote conformance is optional.

Conditional Phrase

Certain provisions (i.e., standards or recommended practices, or sub-specifications within certain provisions), begin with a conditional phrase. The conditional phrase states the conditions (one or more) that serve to define the applicability of the provision or sub-specification to the team being evaluated. A conditional phrase begins with the words "*If* the team…"

When assessing a team against a provision or sub-specification that begins with a conditional phrase, the Judge will first determine if a team meets the condition(s) stated in the conditional phrase. If the team meets the stated condition(s), the provision is applicable to the team and shall be assessed for conformance. If the team does not meet the condition(s), the provision or specification is not applicable, and such non-applicability will then be recorded as N/A.

5. LASC Documentation System

The SCSM is used in association with the following related manuals:

- LASC Overview and Guidance (LOG);
- LASC Rocket Challenge Standard Manual (RCSM);
- LASC Judging Handbook (LJH).

The LOG, RCSM, SCSM, LJH, and specific forms comprise the LASC documentation system. LASC documents and forms are available for download on the LASC website (http://www.lasc.space).

6. Official Languages

English, Portuguese and Spanish are the official language of the Latin American Space Challenge; documents comprising the IOSA Documentation System are written in International English in accordance with LASC policy. All documents, including reports, presentation materials, and correspondence with event officials shall be in English. For oral presentations, including videos and on-site presentations, speakers have the flexibility to choose from any of the event's official languages.

7. Manual Revisions

The SCSM is subject to an annual revision, which invariably leads to a new edition of the RCSM. In the event that critical issues emerge impacting the content of the RCSM, a revision to the current edition will be undertaken.. All changes in this document are listed in the revision highlights table. For easier orientation, the following symbols identify any changes made within each section:

- △   Addition of a new item.
- ↻   Change to an item.
- ⊗   Deletion of an item.

Section 1 — Satellite Challenge (SAT)

Section 1 defines the Satellite Challenge (SAT) mission categories, administrative requirements for application and registration, covers each technica deliverable, and details all awards and team eligibility.

1.1. Challenge Overview

The Satellite Challenge is a competition for teams to design a nano or pico satellite mission. The primary objective of each mission is to progress from the initial concept stage to a potential launch on-board of an experimental rocket.

The challenge will recognize and reward teams that successfully pass the design review gates increasing their Technology Readiness Level (TRL), with the potential for their satellite to be launched by one of the experimental rockets of the Rocket Challenge.

Mission Categories & Objectives

SAT 1.1.1. Teams competing in the Satellite Challenge shall design a satellite project in one of the following mission categories:

- PocketQube or CanSat satellite project; or
- CubeSat satellite project.

The Satellite Challenge will have a minimum mission objective for each mission category. This objective can be the sole mission or part of a larger and more complex mission. The objectives for each mission are established below:

SAT 1.1.2. The PocketQube or CanSat Mission shall at least collect air temperature, humidity and pressure. The data may be stored on-board or transmitted by radio to a ground station.

SAT 1.1.2. The CubeSat Mission shall at least collect air temperature, humidity, pressure, inertial, and GPS data. The data may be stored on-board or transmitted by radio, and is analyzed after landing.

LASC will accept registrations for the Satellite Challenge of teams competing only with a satellite project (i.e. an experimental rocket project is not mandatory for this challenge), but teams are encouraged to participate in both challenges or partner with other team for a complete space mission (i.e. rocket launch carrying a satellite).

Teams that have missions selected for both the Satellite and Rocket Challenge are encouraged to launch the experimental rocket with the satellite project onboard. Bonus points may be awarded for successfully integrating missions from both challenges into a single launch, regardless of whether they are from the same team or different teams.

Onsite Event Participation

Teams with selected Satellite Missions are not required to participate in the onsite event. However, onsite participation fosters an environment of knowledge sharing and provides an opportunity for teams to present their work.

The Satellite Challenge will evaluate each selected mission through the design review stages and maturity level gates. The further a mission progresses through these gates, the more points it can receive. The design review stages and maturity level gates are detailed in the following sections.

SAT 1.1.3. Teams with at least one selected satellite mission should participate in the onsite event to foster an environment of knowledge sharing and to potentially present their work.

SAT 1.1.4. Teams participating in the Satellite Challenge should prospect an experimental launch with teams participating in the Rocket Challenge.

Event Site, Logistics & Communication

The Latin American Space Challenge is held at Cabo Canavial, one of the largest grass farms in southeast Brazil. Located in the city of Tatuí, in the state of São Paulo, Cabo Canavial is an ideal location for this event, offering a safe environment with a good infrastructure of hotels and amenities. The Cabo Canavial Launch Area (CCLA) is located on private property at the following GPS coordinates: 23.36903059917333 S, 48.011443501324095 W.

More information about the area, logistics and its infrastructure can be found in the LASC Overview and Guidance (LOG) document, including composition of the event organization team, list of badges and privileges, and other important points regarding security.

For Brazilian teams, road trips are a great option for transporting teams and rocketry-related items to the event, but groups are advised to have multiple alert drivers - the front passenger is encouraged to be awake and alert with the driver.

For foreign teams and those who can not drive, there are two main airports: São Paulo-Guarulhos International Airport (GRU) and Viracopos International Airport (VCP). Make sure to try to find the cheapest option realizing the larger airports might not necessarily be the cheapest option.

Note that São Paulo-Guarulhos International Airport (GRU) is not located in the city of São Paulo but in the city of Guarulhos, approximately 15 km (1 hour drive) from São Paulo city center. We do not recommend teams stay in Guarulhos or nearby cities.

Transportation from São Paulo or Guarulhos to Cabo Canavial can be difficult with luggage and rocketry-related materials and equipment. While there are buses and trains from São Paulo to Tatuí, Cabo Canavial is far from Tatuí city center, and no buses or public transportation will be available. Plan your logistics ahead of time.

Foreign teams should communicate with Brazilian teams for support with logistics and directions. It is important that all participants collaborate with each other before the event. Event officials will not be able to support logistics issues during the event. Teams lacking adequate planning may be penalized or disqualified.

Primary individual team communication will be only via e-mail by lasc@lasc.space. Event officials will only be required to respond to emails. Responses on WhatsApp, Discord, or other channels will be optional (i.e., not mandatory for event officials).

In the weeks leading up to the onsite event, a WhatsApp group will be created for all Mission Leaders and Safety Managers to facilitate fast communication with event officials.

The LASC Documentation System and other forms will be made available through the LASC website (www.lasc.space). All important event announcements will also be shared via social media, such as Instagram.

1.2. Milestones

The Latin American Space Challenge features a timeline that categorizes milestones as either remote or onsite. Remote milestones, detailed in the following figure, outline pre-onsite event activities including application and registration, progress updates, marketing actions, and mission report submissions.

Figure 1: Remote Milestones.
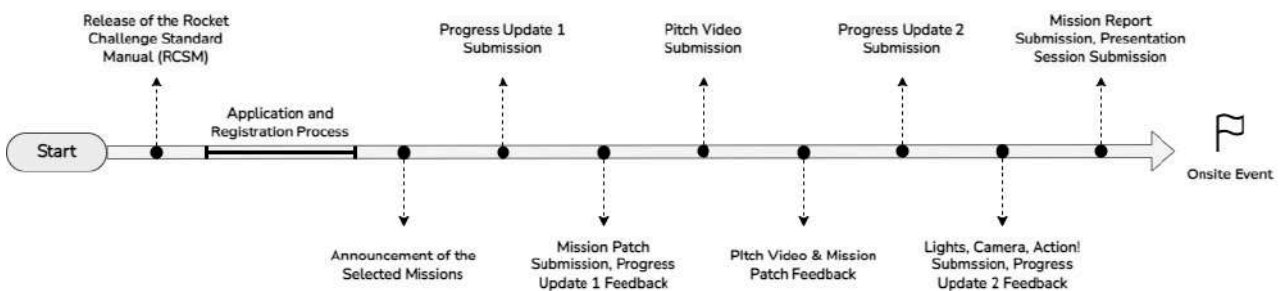
Note: Other milestones may not be included in this figure.

Each remote milestone is outlined in this section, detailing the requirements for each submission and action leading up to the onsite event. Section 3 provides safety provisions that shall be followed throughout the mission development process.

Section 4 of this document describes operational activities related to the Launch Readiness Review (LRR) process and the Slot Assignment Process.

SAT 1.2.1. All Selected Missions shall meet a minimum quality standard for all milestones to secure participation in the onsite event and to be considered for any award.

1.3. Application and Registration Process

Although the event officials aspire to admit all applicants, a selection process is imperative to safely and effectively manage the participation of teams. This selection will not adhere to a first-come-first-served basis; instead, all applications received during the designated application period will be considered equally.

The Application and Registration Process is governed by the **LASC's Mission Selection Process**, which hinges on the availability of slots (i.e., launch windows).

If possible, LASC will accept the **same number of experimental rockets and satellite projects** in both Tier 1 and Tier 2.

Slots are limited and may be affected by external factors, such as adverse weather conditions. Consequently, event officials will select a predetermined number of missions based on a set of criteria designed to maximize safety and the quality of the missions. Additional criteria include compliance with the SCSM, the quality & goal of the submitted mission, the level of technology and innovation, and the team's history and maturity in past events.

Given the historically high volume of applications, teams should be prepared for the possibility of their missions not being selected. Then, due to the limited number of available slots during the event, selected missions could be classified as Tier 1 or Tier 2.

- Tier 1 Selected Missions will be assigned and reserved a presentation slot and a stand during the onsite event.

- Tier 2 Selected Missions will not have a guaranteed presentation slot and a stand during the onsite event. However, they may be allocated vacant or newly available slots during the presentations, following the regulations specified in Section 4.

In addition, throughout the delivery roadmap, if a Tier 1 Selected Mission withdraws, an appropriate Level 2 Selected Mission will be escalated as a Tier 1 Selected Mission.

Figure 2: Mission Selection Process.
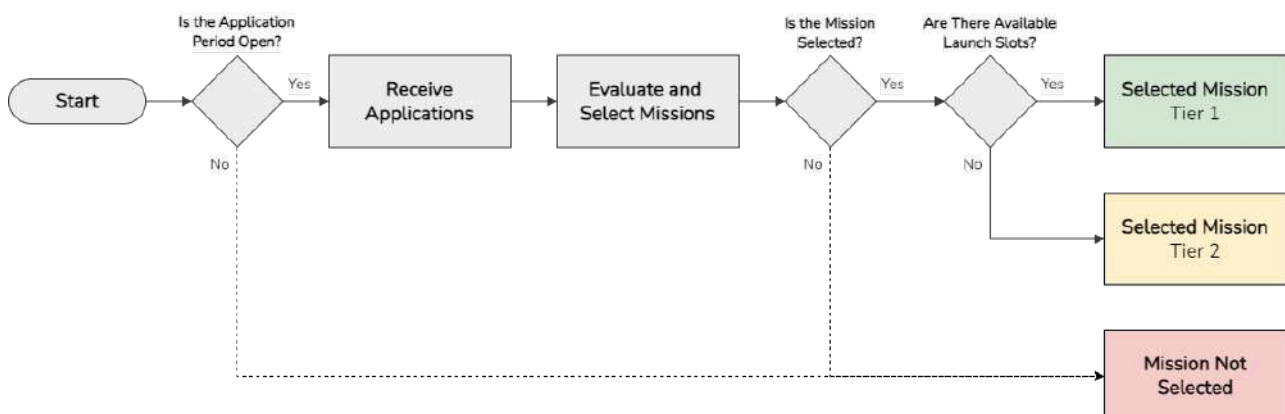
Regardless of the outcome, all teams will be notified about the results of the selection process, including feedback on their submissions up to 30 days after the closing of the applications. It is important to note that submissions received after the application deadline will not be considered under any circumstances.

Submission Limitations

SAT 1.3.1. Teams are limited to submitting a maximum of 2 (two) missions in the Satellite Challenge. If the team submits more than one mission, each one shall be for a different mission category.

As a result, no team may compete in the same category more than once. The event officials will monitor and assess each project independently, regardless of shared student membership or academic affiliation.

Entry Form and Announcement of Selected Missions

The Entry Form can be accessed on the LASC website during the Application Period, as specified in the LASC Overview and Guidance (LOG) document. No payment is due at time of entry.

SAT 1.3.2. Each team is required to submit a complete Entry Form for each Mission Category in which they wish to participate in the Satellite Challenge. All submissions shall be made through the appropriate form available on the LASC website.

SAT 1.3.3. Total completeness of the Entry Form is required, including information specified on Section 2 of this document.

Selected Missions will be announced on LASC website and by the release of a Mission ID list after the end of the application deadline.

Mission Identification Number

All Selected Missions will receive a Mission ID to identify each mission and its associated team. For example, a team participating with two missions will have two Mission ID's: #3-A and #3-B.

SAT 1.3.4. A correspondence between a team with a Selected Mission and event officials shall contain the respective Mission's ID number to enable a more timely and accurate response.

The Mission ID is the officials' primary means of identifying and tracking each team. Once assigned, any correspondence with event officials shall contain the respective Mission's ID.

Team and Individual Tickets

While not classified as a milestone, the process of managing fees and payments is crucial to the overall event. Team and Individual Tickets are required only for Selected Missions. The Latin

American Space Challenge requires a complex infrastructure to safely host all participants during onsite activities. Given the costs associated with providing a comprehensive experience for all attendees, the following specific fees apply to each type of participant:

- **Team Ticket:** The Team Ticket is necessary for the LASC Organization to make down payments on trophies, certificates, web services, launch pads, event structure and additional services before the event.

- **Rocketeer/Satelliteer Ticket:** All team members willing to officially participate in the event shall have a Rocketeer & Satelliteer Ticket, including to access specific areas of the onsite event. This ticket is mandatory for those willing to receive a digital certificate of participation.

- **Spectator Ticket:** Spectators will be welcomed to join the Latin American Space Challenge. There will be a "*Spectator Area*" for parents, friends and people interested in Science, Technology and Space Activities.

Detailed information regarding prices and the payment process can be found in the LASC Overview and Guidance (LOG) document. Participants are encouraged to consult this document.

SAT 1.3.5. All teams with at least one Selected Mission are required to purchase only one Team Ticket in a timely manner. This requirement applies irrespective of the number of missions submitted or challenges in which the team is participating.

SAT 1.3.6. All participants, including rocketeers/satelliteers and spectators, shall have a valid ticket emitted by the LASC Organization to access the onsite event.

SAT 1.3.7. Participants of a selected satellite mission who choose not to participate in the onsite event shall have a valid virtual rocketeers/satelliteer ticket issued by the LASC Organization to receive a digital certificate of participation.

1.4. Challenge Deliverables

The following sections define the deliverable materials event officials require from teams competing in the Satellite Challenge – including as appropriate each deliverable's format and minimum expected content.

All deliverables will be submitted to LASC per the instructions provided to the teams. Each relevant deliverable description will facilitate submission of that deliverable or will be communicated to teams as is determined by LASC Organization. The scheduled due dates of all required deliverables are recorded in the LASC Overview and Guidance (LOG) document, maintained on the LASC website.

Progress Updates

There will be two Progress Updates submitted per Selected Mission due prior to the event to track mission progress in design and development. These forms will contain questions regarding

safety, organization, operations and testing, structures, power systems, data handling, sensors, communications, and recovery. The template for each progress update will be available at least two weeks before the deadline to allow teams sufficient time to collect the appropriate information and data.

SAT 1.4.1. Teams shall submit Progress Updates for each Selected Mission via the Latin American Space Challenge website (https://www.lasc.space/) on 2 (two) specific occasions prior to the onsite event: the Progress Update 1 and the Progress Update 2.

These Progress Updates will record progression in the project's technical characteristics during development. Event officials understand not all technical details will be known until later in the design process. Therefore, the Progress Updates prior to the final submission will be evaluated based only on their timeliness and completeness.

SAT 1.4.2. Total completeness of the Progress Update form is required at all times. Reasonable engineering estimates and approximations are expected during the application process, but will be subject to progressive additional scrutiny in the subsequent Progress Updates.

Teams should briefly mention their ongoing discussions and analysis in the comment fields for any numerical submissions that are known to be unreasonable or remain undecided.

Teams may also respond to undecided criteria by demonstrating their understanding of any applicable event guidance or best practice governing the particular detail.

SAT 1.4.3. Teams should briefly mention their ongoing discussions and analysis in the comment fields for any numerical submissions that are known to be unreasonable or remain undecided.

Teams may also respond to undecided criteria by demonstrating their understanding of any applicable event guidance or best practice governing the particular detail.

Marketing Actions

Since the early days of the Apollo missions, the general public has been captivated by the spectacle of rocket launches, eager for more information and the chance to witness these events firsthand. The allure of a space mission is immense, drawing thousands of people to travel far from home to be near launch sites..

Event officials, seeking to draw more attention to the teams and their missions, recognize the need for structured marketing efforts. Such efforts are essential to realizing the dream of having thousands of spectators watch experimental rockets with satellites as payload.

The Marketing Actions are divided in three deliverables: a Mission Patch, a Pitch Video and a competition for likes/followers in the following social media: Instagram, TikTok, X (Twitter), Facebook and LinkedIn.

Mission Patch

Mission patches are emblems designed and worn by astronauts and people affiliated with a mission, such as Rocketeers and Satelliteers. The patches depict an image associated with the mission.

SAT 1.4.4. Each team shall submit an appropriate Mission Patch for each Selected Mission during the Progress Update 1. Submissions shall be made in a timely manner using the designated form on the LASC Website, following the schedule outlined in the deliveries roadmap.

Team's logo will not be accepted as a mission patch. Late submission will not be accepted and teams may be penalized by not submitting a Mission Patch. For more information and examples, teams should access the following websites:

- Wikipedia - Mission Patch: https://en.wikipedia.org/wiki/Mission_patch
- Human Spaceflight Mission Patches:
  https://www.nasa.gov/gallery/human-spaceflight-mission-patches/
- NASA - Houston We Have a Podcast, Mission Patches:
  https://www.nasa.gov/podcasts/houston-we-have-a-podcast/mission-patches/
- National Air and Space Museum - The Meaning of Mission Patches:
  https://airandspace.si.edu/stories/editorial/meaning-mission-patches

Pitch Video

Reels, short videos, and pitch presentations—these are new terms that have become part of our daily lives. The younger generations are completely immersed in social media, especially videos: easy to watch and fun! To make the competition more diverse and not just about technical development, it is crucial to communicate what each selected mission is doing to the broader society. Therefore, each selected mission will be required to record a pitch video explaining their goals, concept of operations, and anything else the team feels needs to be communicated.

SAT 1.4.5. Each selected mission shall submit a Pitch Video explaining the mission, goals, concept of operations, and other important information and data.

SAT 1.4.6. The Pitch Video shall be no longer than 2 (two) minutes of total duration. On or before a specified date prior to the event, teams shall submit the YouTube link of the video using the appropriate location indicated on LASC website.

The video shall be uploaded on YouTube with a title as "Mission Your_Mission_ID Pitch Video to the 2024 LASC". For example, a team assigned the Mission ID "19", competing in the 2024 LASC, would subtitle their YouTube Video as "Mission 19 Pitch Video to the 2024 LASC".

Lights, Camera, Action!

Don't forget, this is a healthy competition! In order to grow the audience and get more attention to the space activities in the region, teams will be asked to conduct a marketing campaign to get likes and followers in the main social media. On a certain date, LASC will collect a frame of all teams' social media total followers. Then, from a specified time window, teams will be required to post and organically promote their selected missions for the Latin American Space Challenge.

SAT 1.4.7. Each team should promote the selected mission by posting reels, stories, shorts, videos, tweets, and other types of publicly accessible content on YouTube, Facebook, Instagram, LinkedIn, TikTok, and/or X (Twitter). The appropriate content shall be posted during the time windows specified by event officials to the mission leader.

SAT 1.4.8. Each post related to the "*Lights, Camera, Action!*" deliverable shall include the Official LASC Event Patch in the image or video, and the LASC website in the description.

SAT 1.4.9. Each mission leader should timely submit link(s) to the post(s) related to the *Lights, Camera, Action!* to be analyzed by event officials by the appropriate form available on LASC website. There will be a limit of 20 links for each selected mission.

Event officials will collect the total number of followers for each team immediately before and after the milestone window, as well as the total number of likes on posts about the selected mission, to score the "Lights, Camera, Action!" deliverable. The score will be normalized from the team with the greatest marketing reach to the team with the least for each selected mission.

Mission Report (MR)

Each team shall submit a Mission Report describing their mission objectives, the experimental satellite project and each module or system, and the concept of operations (ConOps) to the technical evaluation board and event officials. This document shall include detailed information on the design review, goals, tests, and the most accurate technical data of the satellite.

SAT 1.4.10. Teams shall timely submit a digital, PDF copy of their Mission Report for each Selected Mission, with the file name "Your Mission ID_Mission Report". For example, a team assigned the Mission ID "19" would submit a digital copy of their Mission Report using the filename "19_Mission Report".

SAT 1.4.11. The Mission Report shall be formatted according to the style guide of the Latin American Space Challenge (LASC), using a provided Microsoft® Word document template. Always check the template maintained on the website before drafting your Mission Report to ensure you are using the latest version.

SAT 1.4.12. The Mission Report shall be no longer than 50 pages, including figures, footnotes, sources, source endnotes, nomenclature lists, equations, explanations of variables etc. This does include the Appendices. However, appendices are not necessarily read in detail by the event officials.

SAT 1.4.13. The Mission Report's main title is left to the team's discretion, however; the paper shall be subtitled "Mission Report *Your Mission ID* to the *Year* Latin American Space Challenge".

For example, a team assigned the Mission ID "19", competing in the 2024 LASC, would subtitle their Mission Report "Mission Report 19 to the 2024 Latin American Space Challenge".

Further requirements are given in [Appendix A: Details for the Mission Report](#), including the required minimum Mission Report sections and appendices. Additional sections, subsections, and appendices may be added as needed.

Presentation Session

Event officials aim to promote networking and knowledge sharing between teams during the onsite event. Presentation Sessions will be held in designated slots to foster an environment of technology development. Teams with selected missions may register to participate as speakers in a Presentation Session, discussing specific developments of their mission.

Selected missions chosen to speak in the Presentation Session may receive additional points in the evaluation of their design implementation and/or preferred placement in the queue for slots. The date of the official announcement of selected missions chosen to speak in the Presentation Session will be published in the LASC Overview and Guidance (LOG) document.

SAT 1.4.14. Teams should submit a digital PDF copy of their Presentation Session Slides for a specific Selected Mission to the appropriate LASC submission form available on the website. The file name should be "Your Mission ID_Presentation Session." For example, a team assigned the Mission ID "19" would submit their slides using the filename "19_Presentation Session."

SAT 1.4.15. There will be no template for this deliverable to avoid impacting the creativity of each team. However, all slides must include the Official LASC Event Patch in one of the slide corners to identify the event in the material.

SAT 1.4.16. The Presentation Material's main title is left to the team's discretion, however; the first slide shall be subtitled "Presentation Session *Your Mission ID* to the *Year* LASC".

For example, a team assigned the Mission ID "19", competing in the 2024 LASC, would subtitle their Presentation Slide "Presentation Session for Mission 19 to the 2024 LASC".

SAT 1.4.17. The presentation can be given in English, Portuguese, or Spanish; however, the slides shall be in English. Teams should inform the language to be used during the Presentation Session in the appropriate LASC submission form. The language shall not be changed after submission.

SAT 1.4.18. Each Presentation Session shall last between 7 and 10 minutes for the presentation, followed by up to 5 minutes for questions and answers, totaling a maximum session duration of 15 minutes.

LASC Participant Agreement

All participants from every team must sign the **LASC Participant Agreement** (Waiver and Release of Liability) with no exceptions. To the extent permitted by law, the team shall indemnify and hold harmless LASC and its Event Officials from any and all claims, lawsuits, liabilities, damages, and/or injuries of any kind whatsoever (including but not limited to monetary loss, property damage, personal injury, and/or wrongful death), whether brought by an individual or other entity, or imposed by a court of law or administrative action of any federal, state, or local governmental body or agency, arising out of any acts, omissions, negligence, or willful misconduct on the part of the Team or Institution or the Team's or Institution's officers, owners, personnel, employees, agents, contractors, invitees, or volunteers. This includes, but is not limited to, the payment of all penalties, fines, awards, fees, and related costs or expenses.

SAT 1.4.19. It is mandatory that every individual attending LASC – including team members, faculty advisors, and others – signs the LASC Participant Agreement. Individuals who do not sign this form will be unable to participate in any activities occurring at the Cape Canavial Launch Area.

SAT 1.4.20. The LASC Participant Agreement will be sent by e-mail to all officially registered participants after the payment of the Rocketeer/Satelliteer Ticket, but before the submission of the Mission Report, and shall be digitally signed.

SAT 1.4.21. If a registered participant fails to sign the document online, there will be a last chance to sign the LASC Participant Agreement during the check-in session.

Participants attending competition who do not sign this waiver will not be permitted to enter the event facilities.

Foreign Teams and Seeking a Visa

For many foreign teams we have seen before, it is important to seek a visa upon acceptance. Keep in mind that some members of your team may not be citizens of the country where your university is located. Therefore, upon acceptance into the challenge, file for your visas immediately.

If an individual on your team is from a country that has difficulties acquiring a visa, be sure to cross-train replacements in case they are unable to attend the challenge. Ensure that all necessary paperwork is submitted promptly so that team members can attend the competition in person, rather than as a photo affixed to their control panel.

SAT 1.4.22. Each foreign team with at least one Selected Mission shall contact event officials before submitting Progress Update 1 to request a Letter of Invitation. The mission leader shall provide a list of full names, passport numbers, email addresses, and mobile numbers of all team members seeking a visa to Brazil.

1.5. Scores, Evaluation and Awards

Event officials will evaluate competitors for Place Awards within each mission category based on the quality of required project documentation, the quality of their system's overall design and simulation, the mission's overall excellence, efficiency and performance demonstrated at the Mission Report, and finally, the launch operations and safety.

Scoreboards and Award Ceremony

After each appropriate milestone, event officials will publish a partial scoreboard for all mission categories. The partial scoreboard will be available on the LASC website for public access and will be updated automatically after the evaluation of each selected mission.

Event officials will document the evaluations using individual score sheets for each selected mission and then consolidate them into one master scoreboard using the grading criteria set out in the following subsections.

The final scoreboard will be published during the Award Ceremony, including the winners for each mission category.

SAT 1.5.1. The Award Ceremony, to be held on the last day of the event, will be the final milestone of LASC where winners will be announced. All teams shall be present during the Awards Ceremony. If an award-winning team is absent, event officials have the right to select the subsequent team to receive the award. This ensures that recognition is given and accepted in person at the ceremony.

Up to seven days after the Award Ceremony, individual scoring sheets and feedback regarding the strengths and weaknesses of each selected mission's performance will be provided by email.

Handling of Questions & Complaints Regarding Scoring

Teams are welcome to approach the officials to ask for specific, non-binding, oral feedback regarding their perception of the teams' work during all points of the competition to provide the teams with an opportunity to learn and improve.

In the case the teams have more detailed questions or specific complaints regarding the scoring after the scoring has been announced, such as they would like to receive elaborate feedback on a particular aspect of the score for clarification, e.g., to improve upon for the next event, or if they identify an honest mistake made by the jury, the following process applies:

SAT 1.5.2. Only the mission leader can submit a written feedback request once to lasc@lasc.space. Submissions of the feedback are accepted until no later than one week (7 days) after official announcement of the score. To keep the workload on the officials to a reasonable amount, teams are asked to limit their questions plus complaints to 3 (three) in total. Event officials will then review these three questions and/or complaints and provide written feedback.

If an honest mistake in scoring is apparent, event officials will review the score provided to the team and decide on a case-by-case basis if and how to account for this, especially and only if this would significantly affect the overall score and placement of the team.

It should be noted that teams are expected not to abuse this possibility of questions and complaints for bagatelle. Officers will not participate in a discussion questioning the evaluation's reasoning on the score given.

Scoring Categories and Grading Criteria

Missions will be scored in five different scoring categories or areas, which are (1) Team Effort, (2) the Mission Report, (3) the Design Implementation, (4) the Technology and Operations Readiness Level, and (5) Dual-Challenge Bonus. These are weighted according to the following table.

In each scoring category, a set of grading criteria is established. These criteria will be evaluated by the jury for each mission individually. Each grading criterion has several, more detailed, topics that establish what the jury will look for during the grading process.

Table 2: Weight of the Scoring Categories for the Rocket Challenge.

Scoring Categories	Possible Points	% of Total Points
Team Effort	100	10%
Mission Report	200	20%
Design Implementation	100	10%
Technology and Operations Readiness Level	550	55%
Dual-Challenge Bonus	50	5%
TOTAL	1000	100%

These detailed topics are weighed equally within each criterion, while the main criteria are weighted differently within each mission category. The details of the grading criteria can be found in Appendix B: Detailed Grading Criteria.

1.6. Awards

The 2024 LASC will award teams in the First Place and Second Place of each Mission Category, three Technical Achievement Awards, one Women Representation and Diversity Award, the Team Awards and the Overall Winners for the Rocket Challenge.

Best Experimental Satellite of the Year

One team among the First Place Award winners in each category defined in this document will be named the Best Experimental Satellite of the Year. The recipient of this award is determined by qualitative assessments of the event officials made throughout the entire event.

The Best Experimental Satellite of the Year not necessarily will be the highest scoring mission, but will be awarded to a single team chosen by the event officials based on project complexity, technology and innovation. A team is considered eligible for the award after participating in the Satellite Challenge submitting all documents, reports, activities, and presenting the project.

Mission Category "Place" Awards

A First Place Award will be granted to the highest scoring, eligible team in each of the Mission Categories defined in this document. A Second Place Award will be granted to the 2nd highest scoring, eligible team in each Mission Category.

A team is considered eligible for the place award(s) in its category after participating in the 2024 LASC submitting all documents, reports and activities.

In the event, if no teams meet this definition in a given category, event officials may issue Category Place Awards at their discretion based on multiple factors – including points accrued, participation and engagement, and overall performance.

João B. G. Canalle Award for Technical Excellence

The João B. G. Canalle Award for Technical Excellence is a Technical Achievement Award that recognizes a team which demonstrates exceptional overall engineering discipline and technical skill through their analyses and conclusions, project or program planning and execution, operational procedure, manufacturing processes, iterative improvement, systems engineering methodology, robust design, etc.

Any team with a selected mission that participates in the Rocket Challenge or Satellite Challenge is eligible for the João B. G. Canalle Award for Technical Excellence, although it shall have submitted a high-quality Mission Report.

Rick Maschek Engineering Award for Innovation

The Rick Maschek Engineering Award for Innovation is a is a Technical Achievement Award that recognizes a team whose project includes one or more features (including analytic or operational processes as well as components or assemblies) the judging panel finds genuinely "novel", "inventive", or solving a unique problem identified by the team.

Any team with a selected mission that participates in the Rocket Challenge or Satellite Challenge is eligible for the Rick Maschek Engineering Award for Innovation, although it shall have submitted a high-quality Mission Report.

Valentina V. Tereshkova Award for Women Representation and Diversity

The Valentina V. Tereshkova Award for Women Representation and Diversity recognizes a team whose members composition has a substantial percentage of women and diversity. It also recognizes teams who have women and diversity in prominent positions, such as mission leaders.

Any team with a selected mission that participates in the Rocket Challenge or Satellite Challenge is eligible for the Valentina V. Tereshkova Award for Women Representation and Diversity, although it shall have submitted a high-quality Mission Report.

Team Conduct Award

The Team Conduct Award recognizes a team whose conduct throughout the Latin American Space Challenge is exemplary of goals and ideals held by the event organizers. The Latin American Space Challenge should be an event where academia, industry, and the public may come together to preserve, popularize, and advance space science in a collaborative environment energized by friendly competition. The Team Conduct Award will be awarded to a single team chosen by the event officials participating in either Rocket Challenge or Satellite Challenge.

Team Sportsmanship Award

The Team Sportsmanship Award recognizes a team which goes above and beyond to assist their fellow teams and the organizers assure the event is a safe, productive, and enjoyable experience for all involved. They may do this in many ways, such as making themselves available to lend-a-hand whenever and however they can (whether they are asked to or not), being positive role models for their fellow teams, and generally being a "force for good" in every activity in which they involve themselves. The Team Sportsmanship Award will be awarded to a single team chosen by the event officials participating in either Rocket Challenge or Satellite Challenge.

Team Spirit Award

The Team Spirit Award recognizes a team that has displayed an outstanding effort as working as a unit towards a common goal, by being exceptionally organized, reliable, and prepared in all aspects of the competition, be it deliverables, communication, or operation, and goes above and beyond to display a great sense of team spirit and sportsmanship. The Team Spirit Award will be awarded to a single team chosen by the event officials participating in either Rocket Challenge or Satellite Challenge.

Section 2 — Mission Organization (ORG)

Section 2 defines the Mission Organization (ORG) addressing the organization and management system of a team for the purpose of ensuring conformity with all provisions of the event.

2.1. Team Composition and Eligibility

Team Members

ORG 2.1.1. Teams shall be composed exclusively of <u>student members</u>—including high school and technical school students or currently enrolled in a bachelor's or master's degree or were matriculated undergraduate or graduate students during the previous academic year (e.g., former students who graduated shortly before the event remain eligible)—or <u>non-student members</u> such as enthusiasts, researchers, startup members, amateurs, and hobbyists, or mixed.

ORG 2.1.2. There is no limit on the overall number of people per team, but each team shall have a minimum of three enrolled members. Each individual is free to participate on multiple teams, so long as each team is led by a different individual.

ORG 2.1.3. Each team shall assign a Mission Leader during the Application and Registration Process. The Mission Leader will be the point of contact with LASC for all matters, meaning that event officials will always and only directly contact the Mission Leader, and that the Mission Leader should be the only one contacting the LASC Organization.

ORG 2.1.4. Each team shall establish a mission organizational structure that includes at least the following roles: Mission Leader, Safety Manager, and an Operations Manager.

Figure 3: Minimum Organizational Structure Required.
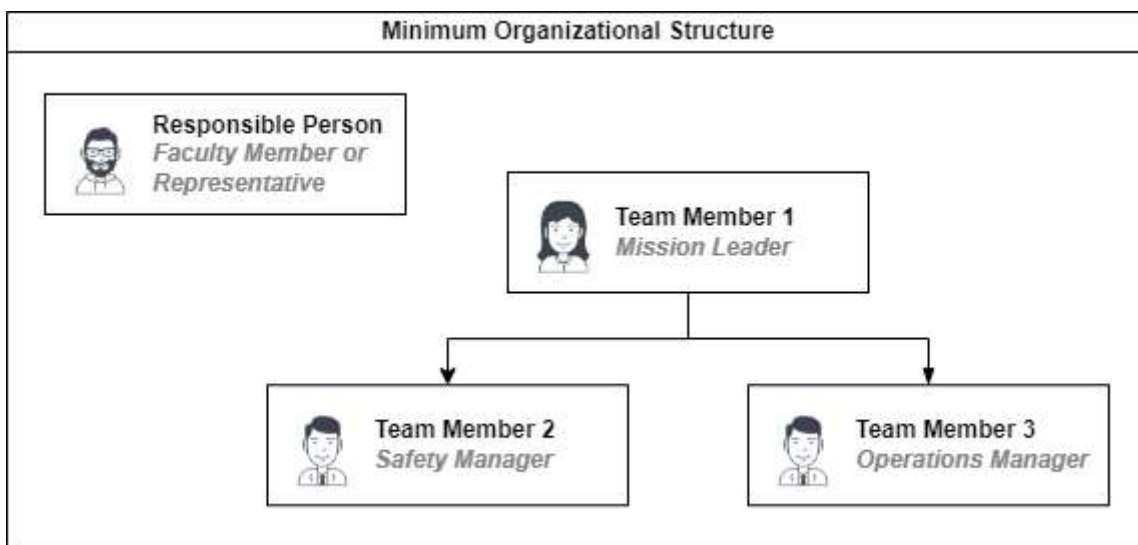
ORG 2.1.5. Each required role in a selected mission shall be filled by a different individual to ensure diverse responsibilities and accountability within the team.

ORG 2.1.6. Each mission shall have a Responsible Person as described in ORG 2.1.7.

Institutional Participation Letter

The Latin American Space Challenge requires that every participating team, regardless of the number of missions or challenges they enter, shall show an affiliation with an academic institution, a company, or an accountable individual who is over the Brazilian legal age of 18. This accountable party shall sign a letter accepting full responsibility for the team members, projects and all activities related to their participation in the event.

Institutions sending more than one team to the LASC need only to write one participation letter, covering all their teams, but each included team shall submit an individual copy of that letter.

In the case of a Joint Team, which is composed of students from multiple academic institutions, each affiliated institution shall provide its own signed letter to the team.

ORG 2.1.7. During the Application and Registration Process, all teams shall send a digital PDF copy of the letter signed by a representative of the institution or responsible individual, acknowledging full responsibility for the team. The signatory shall be a senior faculty member (i.e., professor) or a senior representative of the team (i.e., aerospace/aeronautical or mechanical engineer).

2.3. Insurance

The organization of the event will not be responsible or pay for any accidents, damaged property, and injuries related to the event and caused by selected mission; including if a team's activity damages a person or property. Also, if the person or property owner decides to sue the team, the event's policy does not protect the team from the additional lawsuit.

ORG 2.3.1 All teams participating in the onsite event should obtain and provide proof of insurance coverage for all attending members prior to attending the Latin American Space Challenge. Note: individual, personal, or travel insurance policies do not qualify under this position. LASC is not responsible for and cannot assist in finding suitable insurance policies.

2.4. Unruly Behavior, Disqualification, Withdrawal

Penalties for Unsafe or Unsportsmanlike Conduct

Unsafe conduct includes, but is not limited to, violating any of the established principles stated on LASC Documents, failure to use checklists during operations, violating motor vehicle traffic safety rules, and failure to use appropriate personal protective equipment.

ORG 2.4.1 Team Conduct It is the responsibility of every Mission Leader and Safety & Operations Manager to ensure that their team conducts themselves in a safe and professional manner. There

is a list of point deductions per occurrence that is set prior to the competition for various types of infraction, ranging from not clearing an area in time when a salvo is announced to providing false information on a report.

Unsportsmanlike conduct also includes, but is not limited to, hostility shown towards any LASC participant and officials, intentional misrepresentation of facts to any competition official, intentional failure to comply with any reasonable instruction given by an event official.

ORG 2.4.2 Teams will be penalized for every instance of unsafe or unsportsmanlike conduct recorded by event officials (e.g., judges, volunteers, officials, etc.) depending on the severity of the incident.

Disqualification

A number of criteria constitute grounds for disqualification from consideration for any award and continuation at the event. These can include a failure to meet the defining mission requirements, failure to submit any document and failure to send eligible team members to the onsite event.

Substance abuse and intoxication (or after-effects thereof) during the event and purposeful endangering behaviors severely compromising the safety of LASC and respective participants will make the entire team immediately and without further warning, eligible for expulsion from the LASC event in disgrace. If one or more members of a team fails to be utterly sober and clear-headed, this is regarded as outright contempt of the LASC spirit and safety guidelines. The consequence is the immediate and irrevocable removal of the team from the LASC event.

ORG 2.4.3 Event officials reserve the right to assess any misconduct/mismanagement case by case and to take the necessary proper actions leading to penalties or disqualification of specific team members, mission or the the entire team.

Withdrawal from the SatelliteChallenge

ORG 2.4.4 Teams that decide to formally withdraw a mission from the LASC at any time prior to the event shall send an e-mail entitled "Mission *Your Mission ID* Formally Withdraws From The Event Year LASC'' to lasc@lasc.space.

For example, a team with a Selected Mission assigned the Mission ID "19" would withdraw from the 2024 LASC by sending an e-mail entitled "Mission 19 Formally Withdraws from the 2024 LASC''.

Section 3 — Safety (SAF)

Section 3 details the Safety (SAF) policy and provisions for all missions, members, and teams to ensure event safety. This section covers the general guidelines for Satellite Missions.

3.1. Safety Policy

Safety is our Value number 1.

The Safety Management System (SMS) of the Latin American Space Challenge is composed of four pillars: Safety Policy, Safety Risk Management, Safety Assurance, and Safety Promotion.

All team members shall report any observed unsafe activities to event officials. The event will provide a specific channel for these reports, which will be anonymized before any potential action is taken by event officials.

The event will be guided by a Just Culture approach, where errors will be addressed through reeducation. However, any violation of rules will be treated as potential unruly behavior, with penalties or disqualification possible as outlined in Section 2.

During the Launch Readiness Review (LRR), event officials will use a checklist to approve an experimental rocket for loading with energetics and a rocket motor. Ensuring safety will be a key process for issuing any Flight Card during the event.

Event officials will conduct a safety risk management analysis before each launch to reduce the potential probabilities and/or severities of any operational risks.

Promotion is key to raising the bar among all participating teams. Event officials will conduct safety briefings to increase overall public awareness. Launching an experimental rocket is not trivial; the event has associated risks. All participants shall understand and accept these risks by signing a Waiver and Release of Liability to participate.

SAF 3.1.1. All participants shall follow the Latin American Space Challenge Safety Policy.

SAF 3.1.2. Participants in the satellite mission will not engage in activities after potential integration with the experimental rocket but must adhere to the Safety Policy at all times. Participants engaged in both satellite and rocket missions shall coordinate their activities with event officials.

Safety Briefing

SAF 3.1.3. During the event, event officials will provide safety instructions to all safety managers and mission leaders. Attendance is recommended for all team members in positions of trust in Satellite Missions.

Flag Hazard Communication

LASC will use a flag hazard communication system similar to other competitions, with three different colors: Green, Yellow, and Red. If no flag is displayed in the designated locations, it means that the Launch Area is closed (i.e., no operations or preparations are underway).

Access to the Launch Control Center (LCC) and Launch Area will be restricted under any flag condition. Only authorized personnel with Launch Operations Badges will be permitted to access these areas.

Green Flag

During normal setup intervals with no experimental rockets on the launch pad, the range will be indicated by a Green Flag. When the Green Flag is displayed, teams can enter and leave the Rocket Assembly Area (RAA) and prepare their rockets and launch equipment.

Yellow Flag

When a launch is scheduled according to the Launch Slot system described in Section 4, the range will switch to a yellow flag. At this point, all participants with a badge who are not designated as priority or critical must evacuate to the Spectator Area, leave the assembly tents, and/or exit the Rocket Assembly Area (RAA).

Final launch checks will be conducted at the Launch Control Center (LCC), and the Launch Area will be secured for the safety of launch personnel. As soon as a Yellow Flag is displayed, teams shall close any containers or tents and prepare for the launch of the experimental rockets.

Red Flag

When the range is red-flagged, it means that the process of arming avionics and installing igniters is being conducted by the launch personnel authorized by the event officials. Once these processes are completed, all launch personnel will be evacuated to the Launch Control Center (LCC) or directly to the Spectator Area.

Event officials will then begin the launch procedures. After the rockets have been launched or aborted, the Launch Area will return to a green flag.

SAF 3.1.4. All teams shall halt any preparation and/or assembly when a Yellow Flag is displayed.

SAF 3.1.5. If a Yellow Flag is displayed, all participants in the Rocket Assembly Area (RAA) shall evacuate to the Spectator Area and/or leave the tents.

3.2. Emergency Response Plan

During the Open Ceremony, event officials will present the Emergency Response Plan (ERP), emergency exits, procedures and general instructions in case of emergencies.

In the event of an actual emergency, event officials will halt all launch operations and preparations, and will conduct a proper evacuation of the launch area to the Event Center, which will serve as the Emergency Assembly Point (EAP). The EAP is intended to provide a safer area for individuals to stand, while waiting for emergency personnel to respond.

SAF 3.2.1. In case of an emergency, all team members shall immediately follow any instructions given by event officials. Failure to comply with these directions will result in the team's immediate disqualification from the event.

Ambulance and paramedics will be available at the event for occurrences in the operational area and, also, in the spectator area. If any emergency occurs, event officials will halt any launch operation, launch preparation, and any activity in the Rocket Assembly Area (RAA).

3.3. Mandatory Safety Guidance

SAF 3.3.1. No energetics can be stored and/or transported in closed vessels or any other condition that may cause pressurization.

SAF 3.3.2. The personnel involved in any operation or integration shall wear Personal Protective Equipment (PPE). The minimum PPE required are the helmet and a signaling vest. Additional PPE provided by the teams are welcome.

SAF 3.3.3. Satellites shall not contain any energetic devices.

SAF 3.3.4. Satellites shall not contain any propulsion system.

SAF 3.3.5. Satellite missions seeking to independently recover shall consider activation of the recovery system by the experimental rocket's electronics system.

SAF 3.3.6. The satellite shall have an external and easily accessible manual hardware kill switch that isolates battery power from the rest of the satellite payload system.

SAF 3.3.7. No exposed point or area of the satellite shall carry a live voltage at any point during operation of the satellite payload.

Section 4 — General Requirements (GEN)

Section 4 defines the General Requirements (GEN) overall guidance and requirements for the development of satellite projects, including material selection and prohibitions. The following provisions address key points applicable to all satellite projects independently of mission category and form factor.

4.1. General Satellite Mission Requirements

GEN 4.1.1. The total budget of the final satellite project should not exceed USD 1,000. Ground Stations (GS) and any related non-flying item will not be considered in the budget. In the case of sponsorship, all sponsored items should be specified in the budget with the actual corresponding costs on the market.

GEN 4.1.2. The Satellite Mission shall comply with the minimum mission objectives stated on Section 1.

GEN 4.1.3. The Satellite Mission shall ensure no deliberate detachment of any components throughout the lifetime of the entire mission, including launch, ejection (optionally) and recovery.

GEN 4.1.4. The Satellite Project should be able to withstand an acceleration of up to 20 g. This provision is complemented in Section 6.

GEN 4.1.5. Inclusion of a positioning system for retrieval (beeper, radio beacon, GPS, etc.) is recommended.

4.2. Forbidden Materials

GEN 4.2.1. Explosives, detonators, pyrotechnics, and inflammable or dangerous materials are strictly forbidden. All materials used shall be safe for personnel, equipment, and the environment. In case of doubt by LASC, Material Safety Data Sheets (MSDS) may be requested from the teams.

GEN 4.2.2. Materials that can be toxic, flammable or potentially hazardous shall not be used. The use of Li-Ion batteries is exempted from this constraint, provided that there is adequate prevention against thermal runaway.

4.3. Electrical System and Frequency Guidelines

GEN 4.3.1. The Satellite Project shall be powered by a battery and/or solar panels. It must be possible for the systems to remain switched on for 4 (four) continuous hours.

GEN 4.3.2. The battery shall be easily accessible in case it has to be replaced/recharged.

GEN 4.3.3. The Satellite Project shall have an easily accessible master power switch.

GEN 4.3.4. The antennas, transducers and other elements of the Satellite Project shall not extend beyond the satellite's maximum diameter until it has left the experimental launch vehicle.

GEN 4.3.5. The assigned frequency should be respected by all missions in the Launch Campaign. It is recommended that teams pay attention to the design of the Satellite Project in terms of hardware integration and interconnection, so the radio frequency can be easily modified if necessary.

4.4. Launch Readiness Review (LRR)

GEN 4.4.1. All Satellite Missions willing to be evaluated and/or launched during the Latin American Space Challenge shall be prepared for a Launch Readiness Review (LRR).

GEN 4.4.2. Missions willing to launch their satellite projects during the Latin American Space Challenge shall request the initial Launch Readiness Review (LRR) together with the experimental rocket that will be the launch vehicle.

If a satellite mission is not ready or fails to present the project at the same time of the experimental rocket mission, the launch of the satellite will be denied.

GEN 4.4.3. Missions not willing to launch their satellite projects may request a Workbench Evaluation (i.e., Launch Readiness Review) at the Mission Control Center (MCC) at any time.

GEN 4.4.4. The Launch Readiness Review (LRR) will take place at the event officials' tent in the Rocket Assembly Area (RAA) designated as Mission Control Center (MCC). The LRR must be requested by the Mission Leader.

During the first request for an LRR, the mission will be placed in a queue with a determined priority. Subsequent requests will follow the queue based on the assigned slot, position in the process, and mission complexity.

GEN 4.4.5. Teams shall ensure that the satellite is in an LRR-ready state before the first evaluation or if it is a revisit after an "orange" LRR Status. The Launch Readiness Review (LRR) will follow a checklist based on the provisions of this document. Each item on the checklist will serve as a criterion for the review.

All criteria of the LRR can be scored as "red" (Denied), "orange" (Action Needed), "yellow" (Provisional), "green" (Approved), or "gray" (Not Applicable). The Launch Readiness Review (LRR) details can be found in the Chapter 4 of the LASC Rocket Challenge Standards Manual (RCSM).

GEN 4.4.6. If a Satellite Mission fails to pass the Launch Readiness Review (LRR), the experimental rocket mission will not be affected. Conversely, if the experimental rocket mission fails, the Satellite Mission will remain unaffected. However, scores may be deducted accordingly.

Section 5 — CubeSat Requirements (CUB)

Section 5 defines the specific requirements for CubeSat (CUB) satellite projects, including form-factor dimensions, mass, specific guidance, and other related criteria.

5.1. CubeSat Mass, Volume, and Interface Requirements

CubeSats are nanosatellite platforms based on a cubic-shaped form factor (approximately 100x100x100 mm per unit).

The external dimensions and typical maximum mass are slightly different depending on the number of units, as outlined in the following for the 1U, 2U and 3U cases.

CUB 5.1.1. The only CubeSat form-factors permitted for the Latin American Space Challenge are 1U, 2U, and 3U.

Table 3. CubeSat Dimensions.

Number of Units (U)	External Dimensions (mm)	Minimum Mass (g)	Maximum Mass (g)
1U	100x100x100	700	1330
2U	200x100x100	1400	2660
3U	300x100x100	2800	4000

CUB 5.1.2. Deployables such as antennas shall be constrained by the CubeSat, not the dispenser.

CUB 5.1.3. The CubeSat center of gravity should fall within the ranges specified in the following table:

Table 4: Ranges of Acceptable CG Locations as Measured from the Geometric Center on each Axis.

Number of Units (U)	X axis (cm)	Y axis (cm)	Z axis (cm)
1U	+ 2 / -2	+ 2 / -2	+ 2 / -2
2U	+ 2 / -2	+ 2 / -2	+ 4.5 / -4.5
3U	+ 2 / -2	+ 2 / -2	+ 7 / -7

CUB 5.1.4. The CubeSat structure should be made from aluminum alloy. Typically, Aluminum 7075, 6061, 6082, 5005, and/or 5052 are used for both the main CubeSat structure and the rails.

CUB 5.1.5. Rails should have a minimum width of 8.5 mm measured from the edge of the rail to the first protrusion on each face. Rails should have a surface roughness less than 1.6 µm. The edges of the rails should be rounded to a radius of at least 1 mm. The ends of the rails on the +/-Z face shall have a minimum surface area of 6.5 mm x 6.5 mm contact area with neighboring CubeSat rails.

Section 6 — CanSat Requirements (CAN)

Section 6 defines the specific requirements for CanSat (CAN) satellite projects, including form-factor dimensions, mass, specific guidance, and other related criteria.

6.1. CanSat Mass, Volume, and Interface Requirements

CanSats are picosatellite platforms based on a cylinder-shaped form factor. The challenge is to fit all the major subsystems, such as power, sensors and a communication system, into this minimal volume.

CAN 6.1.1. The only permitted CanSat form-factor for the Latin American Space Challenge is 1C, as described in Table 5. All missions with a CanSat project shall comply with this established form factor.

Table 5. CanSat Dimensions.

Form Factor	Diameter (mm)	Height (mm)	Minimum Mass (g)	Maximum Mass (g)
1C	66	105	300	400

CAN 6.1.2. The mass of the CanSat must be between a minimum of 200g and a maximum of 300g. CanSats that are lighter must take additional ballast with them to reach the 200g minimum mass lower-limit required.

CAN 6.1.3. Radio antennas and GPS antennas can be mounted externally on the top or bottom of the can, depending on the design, but not on the sides.

CAN 6.1.4. Any antennas, transducers and other elements of the CanSat cannot extend beyond the can's diameter until it has left the launch vehicle.

CAN 6.1.5. Recommended materials for the structure are: PLA, ABS, PP e PETG. Potential metallic materials such as aluminum alloy may also be used.

Section 7 — PocketQube Requirements (PQB)

Section 7 defines the specific requirements for PocketQube (PQB) satellite projects, including form-factor dimensions, mass, specific guidance, and other related criteria.

7.1. PocketQube Mass, Volume, and Interface Requirements

PocketQubes are picosatellite platforms based on a cubic-shaped form factor (approximately 50x50x50 mm per unit) with each side one-half smaller than a CubeSat (100x100x100 mm per unit).

PQB 7.1.1. The only PocketQube form-factors permitted for the Latin American Space Challenge are 1P, 2P, and 3P.

Table 6. PocketQube dimensions.

Number of Units (P)	External Dimensions without Backplate (mm)	Sliding Backplate Dimension (mm)
1P	50x50x50	58x64x1.6
2P	50x50x114	58x128x1.6
3P	50x50x178	58x192x1.6

PQB 7.1.2. PocketQube-projects shall comply with the established minimum and maximum required mass detailed in Table 7.

Table 7. PocketQube minimum and maximum mass.

Number of Units (P)	Minimum Mass (g)	Maximum Mass (g)
1P	200	250
2P	400	500
3P	600	750

PQB 7.1.3. The envelope around the PocketQube shall be no more than 7 mm for components.

PQB 7.1.4. For appendages and deployables, maximum 10 mm is allowed. All deployable components shall be constrained by the PocketQube and not by the deployer.

PQB 7.1.5. The center of mass of the PocketQube shall not exceed 1 cm from its geometric center in a stowed position.

PQB 7.1.6. Recommended materials for the baseplate are: FR4 and Aluminum (7075, 6061, 6065, 6082).

PQB 7.1.7. Recommended materials for the structure are: PLA, ABS, PP e PETG. Potential metallic materials such as aluminum alloy may also be used.

PQB 7.1.8. Potential metallic materials used for the PocketQube that are in contact with the deployer and standoffs should be hard anodized.

PQB 7.1.9. All PocketQubes shall use at least two kill switches to keep the satellite offline while in the deployer.

PQB 7.1.10. Kill switches shall be located only on the Z-axis. There are two different possible placement areas:

> a) In the lateral side of the satellite within 20 mm from the Z-faces and touching the deployment rails;

> b) Aligned with the sliding backplate in Z-face and in contact with the PocketQube below or the pusher plate.

PQB 7.1.11. The kill switches shall not obstruct ejection of the satellite from the deployer and/or experimental rocket.

Section 8 — Satellite Structure and Materials (SSM)

Section 6 defines the Satellite Structure and Materials (SSM) overall guidance and requirements for the development of satellite projects, including material selection and prohibitions.

The following provisions address some key points applicable to the satellite projects, but are not exhaustive of the conditions affecting each unique design. Each team is responsible for thoroughly understanding, analyzing, and mitigating their design's unique load set.

8.1. Overall Structural Integrity

STR 8.1.1. Satellites shall be constructed to withstand the operating stresses and retain structural integrity under the conditions encountered during handling transportation, and the potential launch operation.

8.2. Material Selection and Tests

STR 8.2.1. Satellites shall be constructed from lightweight materials, such as 3D-printed low-temperature polymers or ductile lightweight metals like aluminum. The choice of materials and assembly techniques must be appropriate for the specific requirements to ensure optimal performance and safety.

STR 8.2.2. The use of natural composites such as wood, cardboard, hemp fiber composites, bamboo composites, etc. should be examined for effectiveness and appropriateness.

STR 8.2.3. Teams should simulate and/or test the properties of materials and the strength of components developed for use in their satellites. This process should include both individual and joint analyses to ensure the integrity of all parts.

It is important to verify the suitability and durability of all materials and parts under the specific conditions they will face during their missions, as this is essential for ensuring launch safety.

STR 8.2.4. Environmentally hazardous materials shall not be used in the satellite project. This includes lead, mercury, uranium, and any other radioactive materials.

Section 9 — Electronic Power System and Communications (ECS)

Section 9 defines the Electronic Power System and Communications (ECS) guidance and overall requirements for any satellite mission.

9.1. Power Systems and Critical Wiring

Electronic Power Systems and Rail Standby Time

ECS 9.1.1. The on-board power system shall be designed and provided by each team. Teams are not required to design solar panels.

ECS 9.1.2. The on-board power system shall store enough energy to ensure power throughout the test mission or launch campaign.

ECS 9.1.3. In order to overcome critically inefficient use of valuable and limited launch campaign time, including slot availability, satellite projects shall have at least 4 (four) hours of battery endurance.

ECS 9.1.4. Satellites should incorporate battery circuit protection for charging/discharging to avoid unbalanced cell conditions.

Remove Before Flight (RBF)

ECS 9.1.5. Each satellite shall include an RBF pin.

ECS 9.1.6. The RBF pin shall cut all power to the satellite once it is inserted into the satellite.

ECS 9.1.7. The RBF pin shall be removed from the satellite after integration into the experimental launch vehicle.

9.2. Communications and Radio Frequency

ECS 9.2.1. The communication system shall be designed and provided by each team.

ECS 9.2.2. The communication system shall be wireless.

ECS 9.2.3. The communication system shall be able to operate the satellite from an isolated location with no line of sight.

ECS 9.2.4. The communication system shall not utilize pre-existing infrastructure, such as Wi-Fi, Bluetooth, or NFC.

ECS 9.2.5. All wireless communications must use U.S. or Brazilian legal frequencies and shall be used responsibly.

Radio Frequency

ECS 9.2.6. Competitors agree that use of Radio Frequencies (RF) for any purpose will be in accordance with U.S. or Brazilian laws and regulations. Each team shall coordinate frequency allocation with the LASC Organizers.

ECS 9.2.7. For all communications, any electromagnetic spectrum frequency (e.g., RF, infrared, visible light, etc.) is allowed, subject to all applicable spectrum allocation.

ECS 9.2.8. Each team is responsible for coordinating RF operating licenses for both their satellite and for all ground stations under their control if required.

Section 10 — Recovery System (REC)

Section 10 defines the Recovery System (REC) guidance for the recovery system, parachute design, and other requirements.

10.1. Guidance

Satellites may be independently recovered (i.e. using its own parachute or non-parachute recovery system) or may be kept in the payload bay of the experimental rocket while it is recovered.

REC 10.1.1. The satellite shall be independent of the experimental rocket, with no fixed electrical connection between the two. The satellite shall not command any deployment action of the recovery system or any other type of action.

REC 10.1.2. Satellite missions shall plan their recovery using either dependent or independent recovery systems in advance.

REC 10.1.3. Satellite missions with a dependent recovery system shall keep the satellite inside the payload bay or airframe throughout the entire launch operation.

REC 10.1.4. If a satellite mission opts for an independent recovery system, the size, mass, and volume of the recovery system shall not be included in the satellite's form factor calculations and measurements.

REC 10.1.5. If a satellite mission decides to use an independent recovery system, the parachute or non-parachute recovery device shall be easily detachable from the structure.

Deployment Event for Satellites with Independent Recovery System

REC 10.1.5. The deployment event for independent payload/satellite recovery shall occur at or lower than 1,500 meters above ground level, with a target descent rate sufficient to permit data collection but not so high as to exacerbate wind drift (e.g., between 20-45 m/s).

REC 10.1.6. The satellite shall be protected to prevent damage from the deployment event initiated by the experimental rocket's recovery electronic system.

10.2. Parachute Design Guidance

It is highly recommended that teams choose traditional parachute-based recovery systems. The majority of flight failures occur during recovery, so keeping it simple is advisable, especially if part of the launch operations score directly or indirectly depends on the successful recovery of the satellite.

Non-Parachute/Parafoil Recovery Systems

REC 10.2.1. Teams exploring other (i.e., non-parachute or parafoil based) recovery methods shall notify LASC of their intentions at the earliest possible opportunity, and keep LASC apprised of the situation as their work progresses. LASC may make additional requests for information and draft unique requirements depending on the team's specific design implementation.

Ejection Gas Protection

REC 10.2.2. The recovery system shall implement adequate protection (e.g., fire resistant material, pistons, baffles) to prevent hot ejection gasses (if implemented) from causing burn damage to retaining cords and other vital components as the specific design demands.

Parachute Coloration And Markings

REC 10.2.3. Parachutes shall be high-contrast to the local environment. It is recommended to use orange, white, and/or red colors. This will enable ground-based observers to more easily characterize deployment events with high-power optics..

Appendix A: Details for the Mission Report

Abstract

The Mission Report shall contain an Abstract. At a minimum, the abstract shall identify the mission category in which the team is competing, identify any unique/defining design characteristics of the project, and provide whatever additional information may be necessary to convey any other high-level project or program goals & objectives.

Introduction

The Mission Report shall contain an Introduction. This section provides an overview of the academic program, stakeholders, team structure, and mission organization and management strategies. The introduction may repeat some of the content included in the abstract, because the abstract is intended to act as a standalone synopsis if necessary.

System Architecture and Concept of Operations

The Mission Report shall contain a System Architecture Overview. This part shall begin with a top-level overview of the integrated system, including a cutaway figure depicting the fully integrated project and its major subsystems or modules – configured for the mission proposed.

The Mission Report shall contain a Mission Concept of Operations (ConOps) Overview. This part shall identify the mission phases, including a figure, and describe the nominal operation of all subsystems or modules during each phase (e.g., a description of what is supposed to be occurring in each phase, and what subsystems are responsible for accomplishing this).

No matter how a team defines mission phases and phase transitions, they will be used to help organize failure modes identified in a Risk Assessment Appendix – described in this document.

Weights, Measures, and Performance Data

The Mission Report shall contain Weights, Measures, and Performance Data. This requirement will be satisfied by informing the data in this section of the document. A table with the minimum data is available in the Mission Report template.

Conclusions and Lessons Learned

The Mission Report shall contain Conclusions and Lessons Learned. This section shall include the lessons learned during the design, manufacture, and testing of the project, both from a team management and technical development perspective. Furthermore, this section should include strategies for corporate knowledge transfer from senior team members to the rising underclassmen who will soon take their place.

Hazard Analysis Appendix

The first Mission Report appendix shall contain a Hazard Analysis Report. This appendix shall address as applicable, hazardous material handling, transportation, storage procedures, and any other aspects of the design which pose potential hazards to operating personnel. A mitigation approach – by process and/or design – shall be defined for each hazard identified.

Risk Assessment Appendix

The second Mission Report appendix shall contain a Risk Assessment. This appendix shall summarize risk and reliability concepts associated with the project. All identified failure modes which pose a risk to mission success shall be recorded in a matrix, organized according to the mission phases identified by the ConOps.

A mitigation approach – by process and/or design – shall be defined for each risk identified. A common description of the Risk Assessment is FMECA (Failure Mode and Effect Criticality Analysis). A Risk Assessment/FMECA is often represented as a spreadsheet matrix. The input to the matrix is listed as follows:

- A description of the identified failure mode.
- The likelihood of the failure mode occurring.
- The severity and impact of the failure mode occurring

The likelihood of a failure mode occurrence and the severity of the occurrence is assigned values according to the following tables:

Table 8: Likelihood of Failure.

Failure Probability	Value	Assessment of Risk
Remote	1	This is unlikely to happen.
Occasional	2	This might happen.
Probable or likely	3	This is likely to happen.

Table 9: Severity of Occurrence.

Mishap Severity	Value	Effect of Failure Mode
Minor or negligible	1	Minor impact on mission.
Critical	2	Deterioration of performance and mission.
Catastrophic	3	Safety hazard and/or likely loss of mission

The "Criticality Ranking" is the product of the Failure Probability and the Mishap Severity. The criticality rating is a measure of how urgent and how severe mitigation actions will have to be taken, to reduce the Criticality Ranking.

Table 10: Criticality Ranking.

Mishap Severity	Value	Effect of Failure Mode
1	Minor	This failure mode is not a concern.
2	Minor	This failure mode is of very minor concern.
3	Medium	Justification needed. Jury may decide to review.
4	High	Technical jury approval needed before launch.
6	Critical	Action required to reduce ranking before launch.
9	Critical	Action required to reduce ranking before launch.

The output of the matrix is highlighting and ranking failure mode liabilities to the mission, and the justifications and mitigations to reduce the Criticality Ranking. An example is given below:

Table 11: Risk Matrix.

Failure Mode	Mission Phase	Failure Probability	Mishap Severity	Critically Ranking	Mandatory Comments
Battery Thermal Runaway	Pre-launch phase	1	3	3	A thermal runaway begins when the heat generated within a battery exceeds the amount of heat that is dissipated to its surroundings. A battery balancing system will be implemented to reduce the risk.
Antenna Deployment failure	Deployment phase	2	3	6	Antenna deployment is mandatory for communication. A redundant system is required.

A typical FMECA scale for the complexity of projects attending LASC should feature no less than 10 identified, ranked, commented, and justified failure modes – these should address at the minimum all important and critical failure modes.

Engineering Drawings and Optional Appendix

The final Mission Report appendix shall contain Engineering Drawings and optional appendices. This appendix shall include any revision controlled technical drawings necessary to define significant subsystems or components, and other optional appendices can include, but are not limited to further Subsystem Details, Detailed Structural and Mechanical Calculation, Detailed Logical Process Diagrams, Detailed Software Architecture, and Detailed Electrical Architecture.

Appendix B: Detailing Grading Criteria

The grading will be conducted by the event officials based on the individual grading criterion in the respective mission categories. A summary and overview of the grading scheme is given below for clarity.

Table 12: Grading Scheme.

Count	For Countable/Relative Criteria
91 to 100%	Outstanding Quality/Conformity
76 to 90%	High Quality/Conformity
51 to 75%	No Greater than Average
Up to 50%	Unsatisfactory

Count	For Absolute Criteria
100%	Yes
0%	No

This is meant to be an intuitive and transparent scheme for the jury to follow and the teams to understand.

Team Effort

Team Effort will be graded up to 100 points (10% of 1,000 points possible). The total points for Team Effort is a combination of countable, relative and absolute criteria.

Table 13: Team Effort Grading Criteria.

Criterion	Outstanding	High	Average	Unsatisfactory	Points
1st Progress Report	10 points Compliant to Section 1.4.	-	-	0 point One or more required items missing.	/5
2nd Progress Report	10 points Compliant to Section 1.4.	-	-	0 point One or more required items missing.	/5
Mission Patch	64-70 points Complies with guidance.	-	-	0 point Required item missing or does not comply with guidance.	/10
Pitch Video	26-30 points Completely complies with guidance. Excellent quality, & clarity,	21-25 points Complies with the guidance with a few minor issues. High video and/or sound quality.	15-20 points Minimally complies with guidance. Medium video and/or sound quality. < 10% over or < 20% under time limit.	< 15 points Does not comply with guidance. Low video and/or sound quality. > 10% over or > 20% under the time limit.	/30
Lights, Camera, Action!	The Lights, Camera, Action! points will be normalized from the highest achieving team/selected mission to the lowest. The minimum requirement for not being zeroed is participation with at least 10% of the maximum links requested as stated in Section 1.4.				/50
Team Effort					/100

Mission Report

The Mission Report will be graded up to 200 points (20% of 1,000 points possible) divided into three criteria: Completeness (20 points), Correctness (up to 40 points) and Analysis (up to 140 points). The Completeness Criterion will be scored using Absolute Criteria. The Correctness and Analysis Criteria will be scored in a mix of Countable and Relative Criteria.

Table 14: Mission Report Grading Criteria - Completeness Criterion.

Criterion	Outstanding	High	Average	Unsatisfactory	Points
Completeness	20 points All required items of the Appendix A present.	-	-	0 point One or more required items missing.	**/20**

Table 15: Mission Report Grading Criteria - Correctness Criterion.

Criterion	Outstanding	High	Average	Unsatisfactory	Points
Style	18-20 points Writing was exceptionally clear, understandable, and concise. Sentence and paragraph organization is exceptional. Writing is free of digressions or irrelevant information.	15-17 points Writing was clear, understandable, and concise. Overall paragraph and sentence organization were very good. Digressions or irrelevant information do not significantly detract from the report	10-14 points Writing was generally clear and understandable. Paragraph and sentence organization were generally good. Digressions or irrelevant information detract from the report's analysis.	< 10 points Writing was repeatedly unclear, difficult to understand or wordy. Overall paragraph and/or sentence organization were ineffective or nonexistent. Digressions and/or irrelevant information consistently detract from the analysis.	**/20**
Mechanics	10 points No grammar, spelling, or mechanics errors. Scientific terms correctly used, units and dimensions consistent and correct.	8-9 points No more than a few grammar, spelling, or usage errors. Only a few minor errors with use of scientific terms or dimensions.	5-7 points Significant spelling, usage, and grammar errors that did not detract from readability. Significant errors with use of scientific terms or dimensions.	< 5 points Repeated grammar or spelling errors detracted from readability. Errors with use of scientific terms or dimensions detracted from the report.	**/10**
Format	10 points Completely follows the required template. Meets page limits.	8-9 points Minor deviations from required template. Meets page limits.	5-7 points Major deviations from required template. < 10% over page limits.	< 5 points No attempt at cohesive format or use of required template. More than 10% over page limits.	**/10**
Correctness					**/40**

Table 16: Mission Report Grading Criteria - Analysis Criterion.

Criterion	Outstanding	High	Average	Unsatisfactory	Points
Depth of Analysis	46-50 points Very complete and thorough analysis. All key design decisions are discussed and based	38-45 points Adequate analysis with minor weaknesses. Most key design decisions are discussed and based on design	25-37 points Adequate analysis with significant gaps or weaknesses. Some key design decisions are discussed	< 25 points Inadequate analysis. Few, if any key design decisions were discussed No discussion of	**/50**

Criterion	Outstanding	High	Average	Unsatisfactory	Points
	on design targets, constraints, and appropriate tradeoffs.	targets, constraints, and appropriate tradeoffs.	and based on design targets, constraints, and appropriate tradeoffs. Some minor incorrect statements.	tradeoffs. Parts of analysis conflict with general scientific knowledge.	
Assumptions and Sensitivity Analysis	27-30 points All assumptions are clearly stated. Sensitivity analysis is performed to quantify uncertainty in variables and assumptions.	23-26 points Most assumptions were addressed. Some sensitivity analysis.	15-22 points Unstated assumptions. No sensitivity analysis.	< 15 points No stated assumptions or assumptions were unreasonable. No sensitivity analysis.	/30
Verification and Validation Tests	36-40 points All verification and validation tests were discussed, both for the final design and key iterations leading to that design. Complete and valid conclusions were drawn from the results.	30-35 points Most verification and validation tests are adequately discussed. Appropriate conclusions were drawn from the results, but key iterations prior to final design were not discussed.	20-29 points Some verification and validation tests are discussed but consistent. Unclear that conclusions and decisions were drawn from testing results and analysis.	< 20 points Unclear whether verification and validation tests were performed. Decisions and conclusions were not drawn from the analysis.	/40
Use of Charts and Figures	18-20 points Tables, figures, and appendices all effectively organize and communicate information.	15-17 points Use of tables, figures, and appendices is mostly effective.	10-14 points Use of tables, figures, and appendices is somewhat effective with significant issues.	< 10 points Tables, figures, and appendices were incorrect or misleading.	/20
Analysis					/140

Then, the *total score* of the Mission Report will be the sum of the points for Completeness, Correctness and Analysis.

Design Implementation

The Design Implementation will be graded up to 100 points (10% of 1,000 points possible) divided into two criteria: Design Quality & Decisions (50 points) and Build Quality 50 points). Both will be scored in a mix of Countable and Relative Criteria.

Table 17: Design Implementation Grading Criteria - Design Quality & Decisions Criterion.

Criterion	Outstanding	High	Average	Unsatisfactory	Points
Team Design Vision, Goals and System Engineering	26-30 points A clearly understood design vision with achievable goals, aligned with strategic objectives, and strong evidence of systems engineering discipline throughout the design team.	20-25 points Design vision is mostly understood and achievable with coherent goals. Key project elements address team goals. Good systems engineering discipline throughout development. Most of the design team supports coherent and understood goals.	15-19 points Design vision is incomplete or questionably achievable. Unclear how project elements address team goals. Some lapses in systems engineering discipline. Inconsistent support for team goals and some evidence of design team working at cross-purposes.	< 15 points Questionable or unachievable design vision. Most project elements do not address team goals. Major lapses in systems engineering discipline. No unified design goals, with clear evidence of team members working at cross-purposes.	/20

Criterion	Outstanding	High	Average	Unsatisfactory	Points
Team Knowledge	9-10 points Strong team understanding of the principles governing design and reasoning behind the design. All members of the team can clearly articulate reasoning for choices.	7-8 points Generally good team understanding of the physical principles governing design and reasoning behind the design. Team members defer to a few team "experts" during discussion.	6-5 points Some team understanding of the physical principles governing design and reasoning behind the design. Team members defer to one or two team "experts" during discussion.	< 5 points Inadequate team understanding of the principles governing design and reasoning behind the design.	/10
Presentation Session	20 points Completely complies with Section 1.4.	10 points Complies with Section 1.4. with minor issues.	5 points Minimally complies with Section 1.4.	0 point Does not comply with Section 1.4.	/20
Design Quality & Decisions					/50

Table 18: Design Implementation Grading Criteria - Build Quality Criterion.

Criterion	Outstanding	High	Average	Unsatisfactory	Points
Compliance with LSARPs	13-15 points Completely complies with LSARPs	10-12 points Complies with LSARPs with a few minor issues.	7-9 points Minimally complies with LSARPs.	< 7 points Does not comply with LSARPs.	/15
Design Quality and Robustness	13-15 points Design and build quality are robust and sufficient to operate as intended under reasonably expected conditions.	10-12 points Design and build quality are somewhat robust and sufficient to operate as intended under reasonably expected conditions.	7-9 points Design and build quality are sufficient to operate as intended under specific conditions but are not robust to reasonably expected variations.	< 7 points Design and build quality insufficient to operate as intended under expected conditions. No attempts at robust design.	/15
Fabrication and Construction Methods	9-10 points Fabrication and assembly methods are fully understood and correctly applied. SRAD manufacturing methods are appropriate and well understood, including cost, time, and performance.	7-8 points Fabrication and assembly methods are generally well understood and correctly applied. Manufacturing methods for SRAD elements are both appropriate and reasonably understood by the team, including cost, time, and performance.	5-6 points Fabrication and assembly methods are appropriate, but not completely understood. Manufacturing methods for SRAD elements are appropriate, but not fully understood by the team.	< 5 points Fabrication and assembly methods inappropriate or not understood. Manufacturing methods for SRAD elements are impractical or not well understood by the team.	/10
Consistent Design (30 pts)	9-10 points Clearly consistent with the team's vision. No evidence of key systems added as an afterthought.	7-8 points Generally aligned with the team's vision. No evidence of key systems added as an afterthought.	5-6 points Somewhat aligned with the team's vision. Some key systems added as afterthoughts.	< 5 points No apparent organizing vision. Key systems added as field modifications or afterthoughts.	/10
Build Quality					/50

Technology and Operations Readiness Level

Each mission will be awarded as many as 550 points – 55% of 1,000 points possible – for their presentation and satellite launch operations at the Latin American Space Challenge, demonstrated by technology and operation readiness, successful communication and recovery.

The <u>Technology Readiness</u> constitutes 250 points of the total score assigned to the Technology and Operations Readiness Level. This includes completing an oral presentation, worth 100 points, and the successful demonstration of the minimum required objectives for a satellite during a workbench test, also worth 100 points (i.e., turning the satellite power on and demonstrating a real-time data collection via wireless or wired communication).

The <u>Operation Readiness</u> constitutes 50 points of the total score assigned to the Technology and Operations Readiness Level. This includes completing the Launch Readiness Review (LRR) with a green/approval flight status, worth 25 points, and the successful integration with an experimental rocket, also worth 25 points (i.e., completing the integration of the satellite with the experimental rocket).

The <u>Successful Communication</u> constitutes 150 points of the total score assigned to the Technology and Operations Readiness Level. This includes completing at least one receiving packet of data from the satellite during the launch operations, worth 50 points, and the successful data collecting from the satellite during the flight, also worth 50 points (i.e., collect data from the satellite during boost, coasting, apogee and descent phase). An additional 50 points will be assigned to satellite missions that demonstrate a wireless half or full-duplex communication.

The <u>Successful Recovery</u> of the satellite is worth 100 points of the overall value assigned to launch operations. A recovery operation is considered successful according to the following table of classification:

Table 19: Launch Operations Status and Recovery Points.

Criterion	Outstanding	Recovery Points
No Launch	A Selected Mission either did not request a Launch Readiness Review (LRR), received a Launch Status equals to "orange" or "yellow" during the event, or received a "green" but did not attempt at least one ignition.	**Zero**
Launch Denied	A Selected Mission did not pass the Launch Readiness Review (LRR) due to one or multiple criteria being indicated as "red."	**Zero**
Operational or Launch Failure	The satellite suffered an indirect failure (e.g., Catastrophe At Take Off, No Ignition/Ignition Failure, etc.) or has not been found after an abnormal trajectory during the available recovery slots during the event.	**Zero**
Not Recovered	The satellite has not been found after the nominal trajectory during the available recovery slots during the event.	**Zero**
Extensive Damage	Excessive damage is defined as any damage to the point that, if the systems intended consumables were replenished, it could not be launched again safely.	**Zero**
None or Minor Damage	The satellite has been successfully recovered after a nominal flight with no or minor damages (i.e., if the system's consumables were replenished, it could be launched again safely).	**100**

Dual-Challenge Bonus

A sounding rocket or a launch vehicle transports payloads for research and development, commercial purposes, education or training. An experimental rocket without a payload loses its purpose. The Latin American Space Challenge promotes the development of experimental satellites as part of the mission's payload.

Teams with Selected Missions in both the Rocket and Satellite Challenge will receive a bonus of 50 points if, and only if, the experimental satellite presented in the Satellite Challenge is placed in the experimental rocket and a launch is performed (i.e., the ignition of the propulsion system is initiated).

If two different teams coordinate to fly a satellite in an experimental rocket, the Dual-Challenge Bonus may also be granted. However, both teams must inform event officials of this intent during the Launch Readiness Review (LRR).

Final Score

The maximum points possible are up to 1,000 points, including the bonus points of participating with Selected Mission in both Rocket and Satellite Challenge.

Final Score = (Team Effort + Mission Report + Design Implementation + Technology and Operations Readiness Level) + Dual Challenge Bonus - Penalties