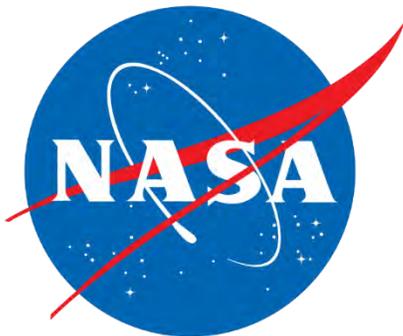


# APOLLO

50 NEXT GIANT LEAP

# TEXAS

## REGIONAL SUPPLEMENTARY MANUAL



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# 1 INTRODUCTION

## 1.1 About NASA Texas Space Grant Consortium

The objectives of Texas Space Grant Consortium, located at The University of Texas at Austin, are:

- Foster sharing of space related course materials among consortium academic institutions
- Foster the development of multi-institutional space research efforts including industry-university teaming
- Foster high quality graduate level space research at consortium academic institutions
- Use interest in space to increase participation in science and mathematics in the public schools
- Foster space-related programs and curricula for public schools and for the public
- Increase the pool of high school graduates who enter college to study science, mathematics, and engineering with emphasis on underrepresented minorities and women

The TSGC membership currently includes 59 organizations -- the largest among the 52 consortia nationally. Members are spread across the state -- El Paso to Beaumont and Corpus Christi to Brownsville. Academic members include institutions: both public and private; large and small; minority and non-minority. Industry members include both large and small companies. TSGC has developed a very balanced program in the mix of higher education, research infrastructure and public service projects that are undertaken by the member organizations.

The Texas Space Grant Consortium has a long history of conducting space related Educational Programs at the K-12 level across the state and the nation. The main objective of Texas Space Grant Consortium K-12 Education Programs is to enhance students and teachers in Science, Technology, Engineering and Match (STEM) fields and/or provide understanding of the benefits of space exploration and space based research. TSGC's K-12 Education Programs goals are:

1. Assist K-12 teachers in exciting their students to learn math and science through space based activities.
2. Increase K-12 educator knowledge in space related fields.
3. Increase K-12 student knowledge in math and science through space related activities.
4. Increase the public's appreciation for the direct and indirect benefits of NASA sponsored research.
5. Direct programs to areas of the state that have the few space related resources.

TSGC provides immersive STEM opportunities for middle and high school students using NASA science and supporting Texas Education Standards. TSGC seeks to increase pathways for students towards careers in STEM, particularly in underserved communities.

The Apollo 50<sup>th</sup> Next Giant Leap Student Challenge leverages TSGC expertise to engage students in technologies relevant for today's society. The challenge also gives students the opportunity to sense the spirit of achievement and exploration exemplified by all those that contributed to the successful landing of the Apollo 11 spacecraft on the moon 50 years ago.

Visit our website: <http://tsgc.utexas.edu>

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## Important Dates &amp; Deadlines

JANUARY, 2019	Official announcement of Apollo 50 <sup>th</sup> Next Giant Leap Student Challenge
FEBRUARY 1, 2019	ANGLeS Kickoff Event, Manual released
MARCH 10, 2019	Regional Supplementary Manual released.
MARCH 30-JUNE 24	Local Organization Challenges and Team Selection
JUNE 1, 2019	Mission Patch due for national competition
JUNE 8, 2019	<b>Error! Reference source not found.</b> winner announced
JUNE 20, 2019	One Month to Landing Social media post due
JUNE 20-24, 2019	Local student organizations nominate one team to the State of Texas Challenge Hub Event
JULY 1, 2019	Texas Challenge Event invitations issued
JULY 8, 2019	Teams confirm Regional Hub Challenge Event attendance and submit travel support requests
JULY 20, 2019	Apollo 11 50 <sup>th</sup> Texas Regional Hub Competition and Awards, Bullock Texas State Museum, Austin, Texas
AUGUST 5-7, 2019	Winners showcase and tour at Johnson Space Center, Houston, Texas



## 2 REGIONAL EVENT INFORMATION

### 2.1 Professional Development

While it is not a requirement to attend a professional development workshop as the training is also available virtually, details on the competition, opportunities to gain skills in operating drones and robotics, and materials and supplies to support the ANGLEs challenge will be provided at the professional development workshops offered in Texas. You will find all details at:

<http://www.tsgc.utexas.edu/apollo50/>

Workshops will be held

 <p>Challenger Center Scobee Education Center San Antonio, TX</p> <p><b>MARCH 30, 2019</b></p>	 <p>TEXAS A&amp;M UNIVERSITY</p> <p>Texas A&amp;M University Zachry Engineering Education Complex College Station, TX</p> <p><b>APRIL 1, 2019</b></p>	 <p>University of Texas at Dallas Synergy Park North Bldg Richardson, TX</p> <p><b>APRIL 3, 2019</b></p>	<p><b>NEW DATE &amp; LOCATION</b></p>  <p>Texas Tech University Whitacre College of Engineering (at Museum of Texas Tech University), Lubbock, TX</p> <p><b>MAY 30, 2019</b></p>
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### 2.2 Support

#### 2.2.1 Funding

TSGC will assist registered teams to participate in crowd sourced sponsorships and provide some materials and supplies to those attending the professional development workshops.

#### 2.2.2 Supply Lending

We have a limited number of free supply kits for Texas programs and teams that can demonstrate need and strong student participation, particularly in underserved communities, and organizations with greater than 50% free and reduced lunch. If approved, supplies provided at no cost will include one Force1 U49W Blue Heron WIFI FPV Drone and one LEGO Mindstorms EV3 Education Edition kit. Vinyl 8' x 10' lunar mats are available for loan at local challenge sites.

#### 2.2.3 Travel Support

As funds allow, organizations and teams that are located 2+ driving hours away from professional development sites and from the State competition in Austin, TX are eligible to apply for travel funds. Teams are encouraged to register even if they are unsure about whether they can participate because of material or travel needs. We cannot budget and identify team needs until registration is complete.



## 2.2.4. Local Competitions

# 2.3 State of Texas Regional Hub Challenge

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## 2.3.1 Date and Location

The Texas Challenge Event will be held on July 20, 2019, at the Bullock Texas State Museum in Austin, TX.

Teams are encouraged to host their own local challenges. These challenges will be organized and run by the local team. Winners from the local challenges will be eligible to submit their portfolios and apply to be selected for the Regional Challenge in Austin, Texas on July 20. Local challenge sites will be listed on the website: <http://www.tsgc.utexas.edu/apollo50>

## 2.3.2 Additions to Challenge Rules

### Lunar Module Design Challenge

#### Background:

The overall goal of the Apollo 50<sup>th</sup> Next Giant Leap Student Challenge is to simulate and learn what is required to build and launch a payload to a distant world. To accomplish this task, scientists, engineers, and designers have to work together to overcome a host of problems. On June 20, 1969, NASA landed the first humans on the Moon. Neil Armstrong took this small step from the ladder of the Apollo Lunar Module. The lunar module is just one part of the system that is required to build and launch a payload to the moon.

The Apollo Lunar Module, which carried the astronauts from lunar orbit to the surface of the Moon and back, used a combination of automated computer control for descent and direct manual control by the astronauts onboard for landing. In the case of Apollo 11, last minute adjustments had to be made as the Armstrong and Aldrin saw the guidance system was sending them toward a boulder field.

#### Objective:

In this Lunar Module Design Challenge teams will need to create a replica of the Apollo Lunar Module. The Lunar Module can be seen in Figure 1. Teams should be creative in their use of materials to construct the lunar module while following the design criteria and constraints below. Your Lunar Module should be designed so that upon landing it doesn't tip or roll into a crater or bolder field.





*Figure 1: Apollo Lunar Module*

### Criteria/Constraints:

- Lunar Module must have a minimum size of 2”x”x2”
- Teams may choose to 3D model & print their lunar module. If you choose this options evidence of student creation of the 3D model will be required in the portfolio.
- Non 3D printed modules must be composed of at least 3 different materials.
- Lunar Modules should be designed so they be transported and released by the UAV.
  - Note: The UAV may be modified to land the Lunar Module.
- High School Only: The Lunar Module will need to be designed so that it can be picked up by the UAV upon completion of the mission and returned to the starting area.

### Project Portfolio

- As part of the submission for the Regional Competition teams must submit a Project Portfolio documenting their design process during this challenge.
- This portfolio can be done electronically with pictures of sketches scanned and inserted into the document.
- The portfolio should include
  - Team Name and Team Members Names
  - Evidence of the brainstorming process. This can be done in note/list form and will more than likely include rough sketches and annotations.
  - Documentation of project progress
  - Final sketch of design with overall dimensions. This may be a Multiview drawing to show all dimensions.
  - Picture of final Lunar Module.
  - Other documentation relevant to this design challenge is acceptable.
  - If 3D printed a screen capture of your design, open in the software you used, needs to be included.



<b>Lunar Module Design Rubric</b>				
	<b>Excellent (5 points)</b>	<b>Good (2.5-4.5 points)</b>	<b>Fair (1.5-2 points)</b>	<b>Poor (0-1 points)</b>
<b>Requirements</b>	Project is larger or matches the accepted dimensions and ALL Materials are documented in the portfolio.	One side of the project doesn't meet the minimum accepted dimensions or 1-2 materials are not documented in the portfolio.	Two sides of the project don't meet the minimum accepted dimensions or 3-4 of the materials are not documented in the portfolio.	The module is smaller than all of the minimum dimensions or most materials are not documented in the portfolio.
<b>Lander is intact</b>	The Module stays intact and undamaged	Module is slightly damaged	The Module has structural damage on more than one side or corner but still together.	The Module breaks
<b>Design Portfolio</b>	All Portions of the portfolio are complete. Name and period on every page. Charts filled out, questions answered in complete sentences	One portion of the portfolio is incomplete OR answers not in complete sentences OR Name and period not on every page	Two or more portions are incomplete or name and date missing with one incomplete portion or one of the above and incomplete sentences	Three or more errors: incomplete work, name date missing, incomplete sentences
<b>Team Work</b>	Design Portfolio provides evidence that all team members were consistently involved in the lunar module design.	Design Portfolio provides evidence that most team members were consistently involved in the lunar module design.	Design Portfolio provides evidence that some team members were sometimes involved in the lunar module design.	Design Portfolio provides evidence that only 1-2 team members were involved in the lunar module design.



### 2.3.3 Challenge Field

The floor lay for the challenge is shown in *Figure 6: Challenge Field Layout*. The lunar landscape of the Apollo 11 landing site at the Regional Hubs will be on an 8-foot by 10-foot print. The UAV and robot operators will be behind a table approximately 10 feet beyond the print of the landing site. The table will be able to hold any laptops needed for the operation of the UAV and robot.

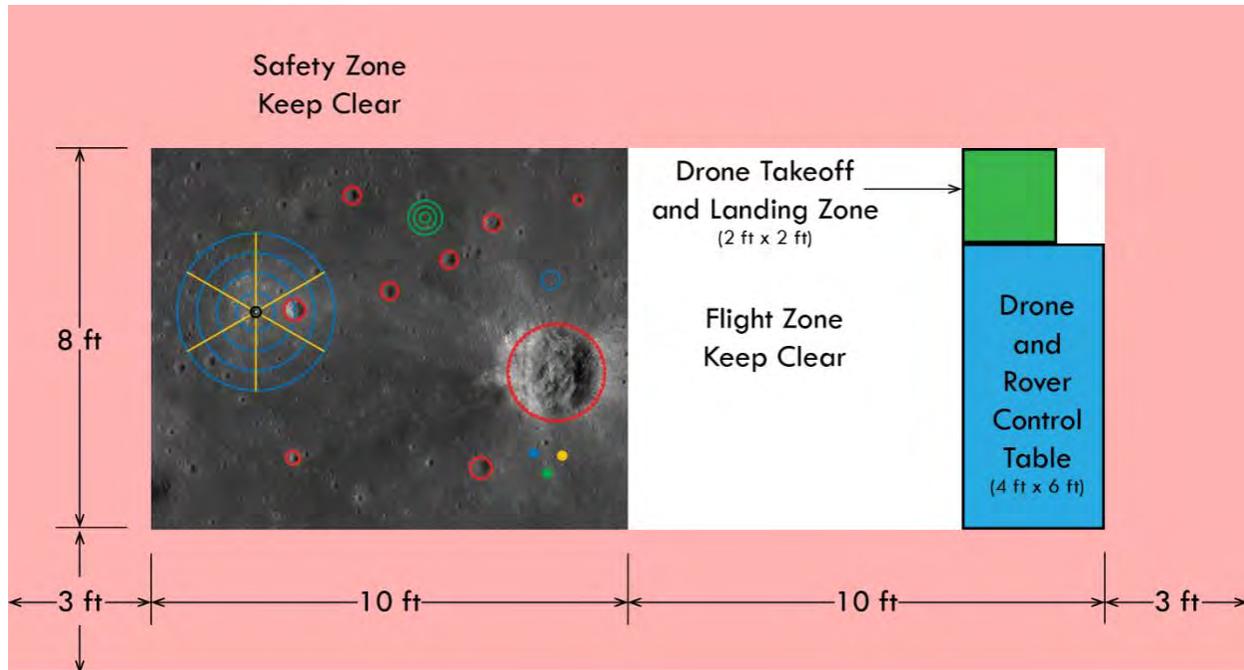


Figure 6: Challenge Field Layout

### 2.3.4 Hosting a Local ANGLEs Challenge

#### Before the ANGLEs Challenge and Judging Begin

- Utilize the <http://tsgc.utexas.edu/apollo50/> website and your own social media to advertise the event and to provide registration information.
- Recruit and train judges and videographer.
- Secure space large enough for 8' x 10' mat, secure area around the mat, table for team set up, and rock samples: breccia, anorthosite, and basalt. Where will teams and observers sit? Provide power strips for teams to charge robot and drone batteries in several locations in the room.
- Set up Registration Table for Check In. Check with the team registration desk to ensure that all teams have checked in. Try to contact teams that are not checked in before removing them from the team registration list.
- Provide an updated team registration list to the Challenge Manager.
- Once the schedule and list of participating teams is established, Regenerate Challenge Schedule, if necessary.
- Print Challenge teams for distribution to each team, the queue crew, scorekeeper, referees, judging teams, and key volunteers. If printing is not available, list teams and times on a flip chart or board. Conduct a team meeting among volunteers prior to the start of the challenge.

#### During the Event

- Ensure that snacks and beverages are available for all volunteers and lunch is provided for full-day of volunteering. Be sensitive to volunteer dietary restrictions. Follow venue food and drink policies. You may wish to have a group provide food, beverages, and snacks for sale if this is an all-day event or allow time for teams to go out for lunch, providing a list of places to eat in the area. Have a 12-1 break for lunch.
- Walk around to proactively resolve any issues, answer questions, and provide support, as needed.
- Ensure that trash containers are emptied and that the restrooms are clean and well stocked.
- Have the scorekeeper periodically save a copy of your event file on a USB flash drive.
- Periodically ensure that the Judges receive updated match results and rankings to support their evaluations of teams.
- Return portfolios to teams after the judging team has completed their evaluations if hard copies were provided. Not necessary if provided electronically.
- If you have numerous teams, do you want an Emcee, sound system, etc? An Emcee could provide updates as teams are competing as to what is happening.
- Encourage all teams, volunteers, and sponsors to participate in the awards ceremony, which celebrates the accomplishments of all teams and provides recognition.
- When judging is complete, collect the list of award winners from the lead Judge.
- Thank your volunteers, coaches, mentors, parents, and sponsors for their invaluable support!
- Announce Challenge winners!

#### After the Event

- Print out scoresheets for the winning two middle school and high school teams. These will be forwarded to [baguio@tsgc.utexas.edu](mailto:baguio@tsgc.utexas.edu) with video and portfolio.
- Take down all equipment and materials for safe storage and clean the venue, as required.
- Establish a plan and a place for participants to pick up lost and found items.
- Send a follow-up message of appreciation to your volunteers.
- Share photos and/or news from the event with the media and your community.

**Celebrate your accomplishments! Remember the smiles! Thank you for your support!**



# GLOSSARY

Above Ground Level (AGL)

Apollo 50<sup>th</sup> Next Giant Leap Student Challenge (ANGLeS)

Drone

Flight Crew

Autonomous

Flight Director

Guidance Officer

Lunar Module

Lunar Rover

Moon

Small Unmanned Aircraft System

