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**Tour:**

**Texas Space STEM - Space Center Houston**

**Destination:**

Johnson Space Center, HOUSTON, TEXAS, USA

**Specialization:**

Science, Math, Engineering, Physics & Design

**Itinerary:**

7-days/6-nights in destination

**Availability:**

Year-round; Sunday departures

### Texas Space STEM - Johnson Space Center, Houston, Texas

Day	Morning	Afternoon
1 Sun	Fly to Houston; Check into Hotel; Welcome, Safety & Orientation Meeting	
2 Mon	NASA Tram Tour - Space Vehicle Mock-Up Facility & Orion Mission Control	Rocket Presentation & Construction Thermal Tile & Cryogenics; Swing Test & Safety
3 Tues	Thermal Tile & Cryogenics Challenge	Natural Buoyancy Lab Tour SCUBA Session & Underwater Robotics Challenge at Williams Pool
4 Wed	NASA Guest Speaker Presentation	VEX Robotics & VEX End Effector Build Challenge Coding Challenge & Competition Mars Yard End Effector Competition
5 Thur	Rocket Safety / Rocket Launch / Rocket Park Tour / Rocket Debrief	Mars Habitat Presentation Mars Habitat Challenge & Presentations
6 Fri	Independence Plaza Tour	Brunch with an Astronaut & Presentation Starship Gallery Tour Graduation & Awards Presentation
7 Sat	Free Time Depart Houston for Home	



## Specialists in STEM Student Travel

As with all sample itineraries, please be advised that this is an 'example' of a schedule and that the activities and hotels shown may be variable dependent upon dates, weather, special requests and other factors. Itineraries will be confirmed prior to travel.



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**OVERVIEW:** Students in Texas Space STEM will experience a **5-day engineering mission to land a rover on the surface of Mars**. They will analyse rock samples with a Reflectance Spectrometer, loft a rock sample into Martian orbit, and return it back to Earth in a rocket of their own design. All the time, working within a NASA budget; knowing that funds or supplies for your projects may be decreased at any time due to budget cuts, safety regulations, or any other experience representative of the real NASA world.

**Skills Required:** Teamwork, problem solving, fiscal responsibility, communication, adaption to unexpected problems, the drive to be successful, and most important, the ability to have fun through STEM exploration.

### Day 1

Due to varied arrival times, groups are 'on their own' for meals on this day. Once your flight times are known, if you would like us to assist you in booking a dinner on this evening, simply let us know and we will be happy to set this up on your behalf.



*Houston....* A sprawl of concrete and superhighway? Intense summer heat? Yes - Houston

has some of that. But the USA's fourth-largest city (5 million in the metro area) is also a multicultural, zoning-free hodgepodge where in one strip mall there might be a Vietnamese grocery, a Venezuelan empanada stand and a big-beef meat market. Eat at great ethnic restaurants or shop in arts-and-antique neighbourhoods. See world-class paintings and funky folk car parades. Then just down the road a bit you can walk the beaches of Galveston Island and visit the astronauts at Space Center Houston. Often described as a "sprawling Texas town," the greater Houston area covers more ground than any other major city in America.

Houston is a city whose very existence has always depended on wild speculation and boom-and-bust excess. Founded on a muddy mire in 1837 by two real estate-booster brothers from New York – their dream was to establish it as the capital of the new Republic of Texas – Houston was soon superseded by the more promising site of Austin, even while somehow establishing itself as a commercial centre. Oil, discovered in 1901, became the foundation, along with cotton and real estate, of vast private fortunes, and over the next century wildly wealthy philanthropists poured cash into swanky galleries and showpiece skyscrapers. Locally produced oil and gas products exported from the Houston Ship Channel have long fuelled the city.



In 1958, President Lyndon Johnson (a Texan) located the National Aeronautics and Space Administration (NASA) here. Houston is also a multicultural city home to some of the nation's largest Asian, Arab and Latin

American populations. But its culture is not limited to diverse population — it also boasts a world class symphony and theatre district that includes a full-time ballet company and opera.

Houston is a beast of a place, choked with rings of highways and high on humidity. Despite this, its sheer energy, its relentless Texas pride, and above all, its refusal to take itself totally seriously, lends it no small appeal. For visitors, its well-endowed museums, highly regarded performing arts scene, and decent nightlife mean there is always something to do. [www.visithoustontexas.com](http://www.visithoustontexas.com)

### *Did you know?*

- ✓ Houston is the fourth most populous city in the nation (trailing only New York, Los Angeles and Chicago), and is the largest in the southern USA.
- ✓ If Houston were an independent nation, it would rank as the world's 30th largest economy.
- ✓ Houstonians eat out more than residents of any other city. While here you can choose to indulge in one of the more than 11,000 restaurants ranging from award-winning and upscale to memorable deli shops.
- ✓ More than 90 languages are spoken throughout the Houston area.
- ✓ Houston is home to the Houston Livestock Show and Rodeo. The largest rodeo in the world, it attracts more than 1.8 million visitors each year.
- ✓ Houston has among the youngest populations in the USA.
- ✓ Houston is home to the Texas Medical Centre, the largest medical centre in the world, with a local economic impact of \$10 billion. More than 52,000 people work within its facilities, which encompass 21 million square feet. Altogether 4.8 million patients visit them each year.
- ✓ When comparing Houston's economy to a national economy, only 21 countries other than the United States have a gross domestic product exceeding Houston's regional gross area product.
- ✓ Home to more than 5,000 energy related firms, Houston is considered by many as the Energy Capital of the world.
- ✓ The Port of Houston is the tenth largest port in the world.

Groups participating in Texas Space STEM will generally arrive in Houston in the late afternoon. Upon arrival, your motorcoach will be awaiting your school to transport you swiftly to your hotel.

After check-in, we'll have our Welcome, Safety & Orientation Meeting. Dinner is on own to accommodate various arrival times. If you would like us to make a reservation on your behalf, simply let us know. We are delighted to help! Groups will want to get a great night's rest because tomorrow, it's full steam ahead with STEM discovery!



## HOTEL OPTIONS

Please let us know the specific hotel you wish for your lodging to be located in when requesting a quote. Each option has a different evening meal and activity plan associated with the property. Your hotel accommodation will be confirmed to you after initial deposits are received.

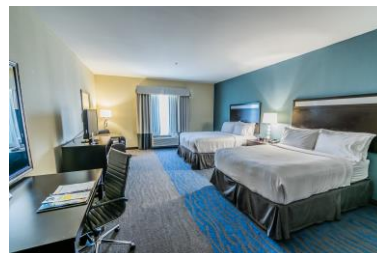
**Sample Hotel – Springhill Suites Houston NASA / Webster** - Just 3-miles from the Johnson Space Center, the Springhill Suites hotel provides easy access to several attractions nearby. All rooms contain two queen beds plus a pull-out sofa sleeper. Students will sleep quad occupancy; staff will sleep double occupancy. Amenities include free high-speed internet access, cable television, hair dryers, in-room coffee maker, mini-fridges and microwaves, business centre, guest laundry, small outdoor pool, sundry shop and meeting rooms. [WEBSITE](#)



**Sample Hotel – Courtyard by Marriott** – This lovely hotel is located directly across the street from the Space Center allowing for participants to **walk** (approximately 5 minutes) to their daily sessions. Amenities include ergonomic workspaces, complimentary high-speed Wi-Fi access, an in-house Bistro & Bar, a sparkling outdoor pool, 24-hour fitness centre, convenience shop and more. Students will sleep quad occupancy in rooms with 2 queen beds; staff will sleep double occupancy. You'll want to have everyone bring rain gear in case of inclement weather as we will be walking to the space centre daily. [WEBSITE](#)



**Sample Hotel – Holiday Inn** – This fabulous property has contemporary rooms featuring desks and flat-screen TVs, plus microwaves, minifridges and coffeemakers. The property has free WiFi, an on-site restaurant and bar, fitness centre, indoor pool and hot tub, sundry shop, guest laundry and more. It's conveniently located near the Baybrook Mall (1.5 miles). Students will sleep quad occupancy in rooms with 2 queen beds; staff will sleep double occupancy. Breakfasts and most dinners will be served at the hotel. [WEBSITE](#)



All breakfasts will be served at your hotel. When selecting your preferred lodging property, please know that each of our hotels offers an independent evening dining and activity plan. Choose the option that best suits your group's needs but please be advised that activities are always subject to change.

SPRINGHILL SUITES GROUPS	COURTYARD GROUPS	HOLIDAY INN GROUPS
SUN - Dinner on own to accommodate flight times	SUN - Dinner on own to accommodate flight times	SUN - Dinner on own to accommodate flight times
MON - Pizza Night	MON - Pizza Night	MON - Pizza
TUES - Dinner & Baybrook Mall	TUES - Dinner & Baybrook Mall	TUES - Hotel Dinner & Bingo or Swimming
WED - Dinner & Bowling	WED - Dinner & Bowling	WED - Catered Dinner at Hotel & Bowling
THUR - Dinner & Cinema	THUR - Dinner & Open Evening	THUR - Hotel Dinner & Quiz, Talent or Presentation
FRI - Dinner & The Kemah Boardwalk	FRI - Dinner & The Kemah Boardwalk	FRI - Dinner & The Kemah Boardwalk

Days 2 through 6

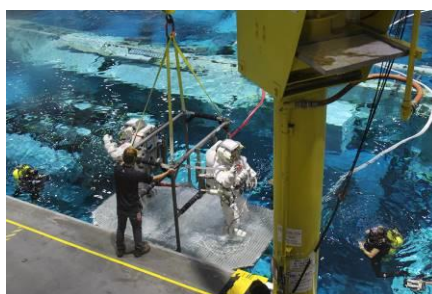
*Breakfast, lunch & dinner*

Rise and shine Houston! Today is the day we delve into STEM projects at Johnson Space Center!



**Johnson Space Center** – The Lyndon B. Johnson Space Center (JSC) is the National Aeronautics and Space Administration's (NASA's) centre for human spaceflight training, research and flight control. The centre consists of a complex of 100 buildings constructed on 1,620 acres (656 ha) in Houston, Texas. Johnson Space Center is home to the United States Astronaut Corps and is responsible for training astronauts from both the U.S. and its international partners. It is often popularly referred to by its central function, 'Mission Control.'

The centre, originally known as the Manned Spacecraft Center, was constructed on land donated by Rice University and opened in 1963. On February 19, 1973, the centre was renamed in honour of the late U.S. president and Texas native, Lyndon B. Johnson. JSC is one of ten major NASA field centres.



Johnson Space Center has its origins in legislation shepherded to enactment in 1958 by then-US Senator Lyndon Johnson. After President John F Kennedy made the goal in 1961 to put a man on the Moon by the end of the decade, the Space Task Force was formed to lead the Apollo Project. The group would need test facilities and research laboratories suitable to mount an expedition to the moon. In July 1961, NASA Administrator James Webb headed the site selection team. Requirements for the new site included the availability of water transport and an all-weather airport, proximity to a major telecommunications network, availability of established industrial workers and contractor support, an available supply of water, a mild climate permitting year-round outdoor work and a culturally attractive community. Houston was selected and announced in September 1961. Construction of the centre began in April 1962 and the facility was officially



opened for business in September 1963. When opened, the 1,620-acre (660 ha) facility was originally designated the Manned Spacecraft Center (MSC) and was to be the primary centre for U.S. space missions involving astronauts.



The centre's Mission Control has been the operational centre of every American human space mission since Gemini IV. The control centre manages all activity on board the spacecraft and directs all space shuttle missions. Mission Control Center was constructed in 1962. By 1965, JSC was fully operational and has been responsible for coordinating and monitoring every crewed NASA mission since the Gemini Project.

In addition to housing NASA's astronaut operations, JSC is also the site of the former Lunar Receiving Laboratory, where the first astronauts returning from the moon were quarantined, and where the majority of lunar samples are stored. The centre's Landing and Recovery Division operated MV Retriever in the Gulf of Mexico for Gemini and Apollo astronauts to practice water egress after splashdown.

The Johnson Space Center is home to Mission Control Center, the NASA control centre that coordinates and monitors all human spaceflight for the United States. MCC directs all Space Shuttle missions and activities aboard the International Space Station. The Apollo Mission Control Center, a National Historical Monument, can be found in building 30. From the moment a spacecraft clears its launch tower until it lands back on earth, it is in the hands of Mission Control. The Mission Control Center houses several Flight Control Rooms, from which Flight Controllers coordinate and monitor the spaceflights. The rooms have many computer resources to monitor, command and communicate with spacecraft. When a mission is underway the rooms are staffed around the clock.



The centre also handles most of the planning and training of the US astronaut corps and houses training facilities such as the Sonny Carter Training Facility and the Neutral Buoyancy Laboratory, which is a critical component in the training of astronauts for spacewalks. The Neutral Buoyancy Laboratory provides a controlled neutral buoyancy environment a very large pool containing about 6.2 million US gallons (23,000 m<sup>3</sup>) of water where astronauts train to practice extra-vehicular activity tasks while attempting to simulate zero-g conditions. The facility provides pre-flight training in becoming familiar with crew activities and with the dynamics of body motion under weightless conditions.

The visitor's centre of Johnson Space Center is "Space Center Houston" since 1994. [www.spacecenter.org](http://www.spacecenter.org)



*Ever dreamed of being an astronaut? Have you wondered what it takes to travel and live on Mars?  
Do you want to engineer your own robotic rover and launch a rocket? Come behind the scenes at*

*NASA's Johnson Space Center for the ultimate educational experience and get a taste of space exploration!*

*Our Texas Space STEM is a week-long program allowing students to work together in conquering space and engineering objectives. At times, other schools may also be visiting and it's a wonderful opportunity to meet new STEM students from around the globe. Texas Space STEM is a challenging 5-day program promoting teamwork, problem solving, communication and engineering solutions to space-related situations. It is designed to develop and improve critical thinking skills, fiscal responsibility, creativity and the drive to be successful.*

**Will you make the cut? There is only one way to know.**

*Immersing students in authentic learning opportunities tied to NASA missions, Texas Space STEM & "Space U" offer a high level of STEM topics applied to real world and space-related experiences. Students will discover areas such as robotics, rocketry, thermal protection systems and space habitats. Get inspired as you come together to engineer solutions to space challenges, collaborate to find solutions and go behind-the-scenes at NASA's Johnson Space Center and the Neutral Buoyancy Laboratory, the world's largest underwater training facility. The program culminates with a graduation ceremony celebrating the students' accomplishments and an exclusive Brunch with an Astronaut.*

This will be your home for the next five days. Each day we will have the opportunity to work with scientists, specialists and astronauts to learn and study in this world-renowned facility. We will be working and competing on PROJECT WORK for Engineering, Physics, Space Science and Design objectives. Teachers are encouraged to participate.



**Texas Space STEM includes the following "Space University" programs:**

- ✓ Hands-on, engineering-based activities and data collection technology integration for real-world analysis
- ✓ Behind-the-scenes access including tours of actual astronaut training and work facilities, such as Rocket Park and the Neutral Buoyancy Laboratory
- ✓ Interactive, project-based learning that includes sustainable habitat construction, robot retrieval mission and programming, multi-stage rocket design and launch, underwater "astronaut training," collaborative teaming and global awareness development
- ✓ Hear from guest speakers about what it takes to work at NASA and the projects that prepare humans for space exploration
- ✓ Brunch with an Astronaut
- ✓ Graduation ceremony and certificates

## SAMPLE Weekly Agenda:

<b>Sunday</b>	Hotel Check-in
<b>Monday</b>	Welcome in Mission Briefing Center, NASA Johnson Space Center tour, one-stage rocket build, thermal and cryogenic design challenge
<b>Tuesday</b>	Rocket launch, Martian habitat challenge
<b>Wednesday</b>	NASA guest speaker, robotics design & construction
<b>Thursday</b>	Neutral Buoyancy Lab tour, robotics competition, scuba dive activity
<b>Friday</b>	Brunch and Q&A with an Astronaut, Starship Gallery tour, Independence Plaza tour, graduation ceremony
<b>Saturday</b>	Free time and depart for home

(Activities are subject to change without notice due to weather or unforeseen circumstances.)

Our NASA program will run Monday through Friday, from 08:30 to 16:00, then extend on in the late afternoons so students have a chance to check-out all the exhibits in the centre. Lunches will be at the Zero-G Diner and are included in your package. In the evenings, please know that we encourage you to participate in our evening event program. If you opt to do something different, please let your Event Ambassador know once you arrive in Houston. They will be able to assist you in achieving best rates for added transportation and extra requirements.

### Day 7

*Breakfast (dependent upon flight time)*

Good morning Houston! This morning we'll start to say goodbye to this wonderful city! We will wave to our new friends as we leave for the airport and hopefully, take away memories that will last a lifetime!





# Project & Program Descriptions

## MARS OR BUST

Participants will have the option to design and build a one or two stage rocket build based on the team goals for their mission. Crew's will launch their rockets the following day to determine who has a successful launch and the highest the altitude. Launch site and may vary based on weather conditions.

## BRING THE HEAT

Students will design, construct and test a thermal heat shield to be able to withstand temperatures up to 1,000° Fahrenheit (538° Celsius). This exercise simulates the effects on the space capsule heat shield during entry into the Martian atmosphere.



## CRYOGENICS TESTING

Can you protect your astronaut from the cold conditions on Mars? Design and build a cryo-capsule to protect your astronauts from extreme temperatures of -321° Fahrenheit (-196° Celsius)

## WORKING IN WEIGHTLESSNESS

Working with licensed dive instructors in a local indoor swimming pool, participants will learn the techniques taught to astronauts as part of their preparation for performing tasks in microgravity. After which students will construct a mock-up airlock and perform other essential tasks similar to those developed by NASA.



## ROVING ROBOTICS

Students must decide how to engineer a robotic rover based on a given set of parameters and tasks that the rover must accomplish on Mars. They begin with a budget, price list for supplies and then are given varying real-

world criteria to design, construct then test their rovers. The rovers will be put to the test by collecting rock samples and executing student designed coding programs to manoeuvre on Mars.

## LIVING ON MARS

What's it like living in space? How do astronauts get enough clean water and air? What happens if something goes wrong? Are there alternate sources of energy? How do astronauts communicate and work with peoples from different cultures? Students will participate in SIM (simulated) scenarios, build their own habitat that sustains core areas of life while maintaining cultural and global awareness.



## NASA EXCLUSIVES: BEHIND-THE-SCENES REALITY TOURS

Students will tour NASA Johnson Space Center with stops at historic Apollo era Mission Control, Neutral Buoyancy Laboratory and the Space Vehicle Mockup Facility including its full-size training modules of the International Space Station. See rockets up-close that were used in early space exploration. Experience the shuttle replica Independence atop the historic Boeing 747 shuttle carrier aircraft.



### INDEPENDENCE PLAZA

Get a rare glimpse into the shuttle program with a tour of Houston's international landmark exhibit Independence Plaza. Students will go inside the high-fidelity shuttle replica Independence, mounted on top of the historic and original NASA 905 shuttle carrier aircraft, and then explore the giant plane. It is the world's only shuttle mounted on an SCA and the only one allowing the public to enter both.

### STARSHIP GALLERY

Starship Gallery at Space Center Houston is home to multiple flown spacecraft and national treasures. Get an up-close look at some of the most amazing artefacts that trace the progression of human space exploration. Students will see and touch real moon rocks and flown spacecraft while learning about the history of space flight.

### BRUNCH WITH AN ASTRONAUT

Dine with a NASA astronaut and hear their first-hand stories about space exploration. Ask questions about their mission experience and learn what it takes to become an astronaut.



### GRADUATION

Celebrate your students' achievements at Space Center U® graduation surrounded by one of the world's most comprehensive collections of space suits in our Astronaut Gallery. To commemorate the special experience, students will receive Space Center U certificates and medals.

## Visions Special Event Weeks

Ask us about our Special Event Weeks for multi-school collaboration!



## TEXAS SPACE STEM – HOUSTON, USA

### **Minimum Booking Numbers:**

20 students

Ages 14 - 18

(Please let us know if under 20 pupils and we may be able to make special accommodations for your group)

### **What's Included:**

Round-trip flights with a scheduled carrier

6-nights' accommodation in destination

Breakfasts, lunches & dinners starting on Day 2 and ending with Breakfast on Day 7

Airport transfers and transportation as shown on itinerary

5-Day NASA Johnson Space Center Master Class Series at Space Center Houston with programming as shown in Detail Itinerary

Graduation Brunch & Ceremony with Certificate Presentation

Evening entertainment program as per hotel selected

Personal Tour Ambassador

24-hour emergency cover

### **What's Not Included:**

Fully comprehensive insurance (mandatory)

Transfers to/from home airport

Transportation for activities not shown in the itinerary

Cost of visas, full or collective passports

Cost of inoculations or medication required for travel

Sightseeing / Entertainment Options not shown in Itinerary

Hotel incidental deposits & bills – meals, mini-bar items, recreation charges, purchases billed to room, etc

Any gratuities – coach drivers, maid / bellman services, area guides, tour ambassador

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**As always, our staff are always available to you to answer any questions you may have regarding programming. If we may serve you in any way, please do not hesitate to contact us.**

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