

# Sky's the Limit

Top schools  
are training tomorrow's  
aeronautics leaders

By Robin Roenker

**N**ASA HAS BIG PLANS for the coming decades, including the establishment of a permanent human presence on the moon and sending the first astronauts to Mars. Here on Earth, advances in aeronautics, including deliveries by drone and autonomous air travel, will reshape the way we live.

A degree from one of these top-rated aerospace engineering schools can help open the door to a rewarding career at NASA:

## UNIVERSITY OF MARYLAND

### A. James Clark School of Engineering

Research specializations in aerospace engineering at the university include rotorcraft technology, advanced propulsion, unmanned aircraft systems and space-centered work. Associate professor Christine Hartzell's research, for example, centers on lessening mechanical disruptions from space dust — essential if we are to have sustained settlements on the moon — while some of her colleagues are focused on designing next-gen spacesuits.

Students can gain hands-on skills via internships at NASA's nearby Goddard Space Flight Center and through competitive rotorcraft and rocket design competitions. "There's renewed interest in going back to the moon, so there's a demand for these skills not only for NASA jobs, but also in the commercial and military sector as well," says Hartzell.

► [aero.umd.edu](http://aero.umd.edu)

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University of Maryland  
doctoral student Lena Johnson

## EDUCATION



CU's new aerospace engineering sciences building

CU BOULDER

## UNIVERSITY OF COLORADO BOULDER

### Ann and H.J. Smead Aerospace Engineering Sciences

"We are the public university that receives the most NASA funding," says Marcus Holzinger, University of Colorado Boulder associate professor of aerospace engineering and associate chair for graduate studies. "We have research ties with all components of NASA's work — from aeronautics to space exploration."

Two faculty members are former astronauts. Others — including Daniel Scheeres, a lead investigator in the OSIRIS-REX mission to explore the asteroid Benu — are directly involved in high-priority NASA projects. Nearly all classes have an integrated lab component which allows for applied learning, and the program's two-semester senior design sequence allows students to build a full project prototype, such as a CubeSat (cube satellite) or an unmanned aerial vehicle, from start to finish.

► [colorado.edu/aerospace](http://colorado.edu/aerospace)



AHIL KANTIPALY/UNIVERSITY OF MICHIGAN

Research assistant Emanuela Della Bosca inspects a tandem pair of CubeSats.

## UNIVERSITY OF MICHIGAN

### Michigan Engineering

Founded in 1914, the University of Michigan (U-M)'s department of aerospace engineering — the first in the U.S. — counts among its alumni the entire crews of Gemini 4, which orbited the Earth, and Apollo 15, the fourth mission to the moon, as well as Kelly Johnson, the designer of the SR-71 Blackbird, and Harry Hillaker, designer of the F-16. The department is home to one of the world's leading electric propulsion research centers — helping shape cutting-edge propulsion technology that will allow us to reach Mars.

The campus' recently launched Space Institute allows for robust cross-disciplinary research collaboration. "Space exploration and engineering, we think, is the future of aerospace," says Anthony Waas, U-M's Richard A. Ahlil department chair of aerospace engineering. Other research specializations include the use of robotics in aircraft manufacturing and the development of drones and unmanned aerial systems. "In our aerospace department, we are training next-generation space people — the people who will staff the future of the space industry, who will be behind routine flights to the moon and to Mars," Waas says.

► [aero.engin.umich.edu](http://aero.engin.umich.edu)



TEXAS A&M UNIVERSITY

Students test their aircraft in the university's wind tunnel.

## TEXAS A&M UNIVERSITY

### College of Engineering

Nearly doubling its faculty in the past 10 years, Texas A&M's aerospace engineering department is in a period of tremendous growth. Professors include former NASA astronauts Bonnie Dunbar and Gregory Chamitoff, and eight National Academy of Engineering members. "They are teaching classes actively and mentoring large groups of researchers, so it is a very exciting time for our department," says associate professor Darren Hartl.

Home to an advanced vertical flight laboratory, an aerospace human systems laboratory, a variety of wind tunnels, a flight simulator and a virtual reality lab, the department offers students an array of opportunities to be involved in hands-on research. The university was one of five original recipients of grants from NASA's \$10 million University Leadership Initiative which supports work to develop supersonic aircraft that produce a diminished supersonic boom. "People think NASA is (just) space, but NASA was aeronautics first, and NASA aeronautics is a great partner to us," Hartl says.

► [engineering.tamu.edu/aerospace](http://engineering.tamu.edu/aerospace)

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## EDUCATION



CORNELL UNIVERSITY

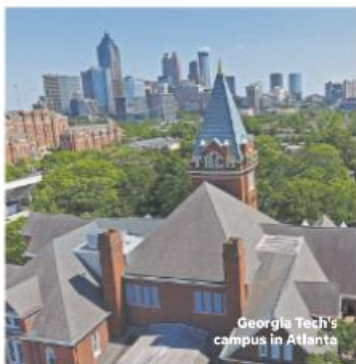
Cornell's Sibley School of Mechanical and Aerospace Engineering is based at the university's Upson Hall.

## CORNELL UNIVERSITY

### Sibley School of Mechanical and Aerospace Engineering

Cornell aerospace engineering graduates often end up working at one of NASA's 10 major centers — or with agencies that contract with NASA — thanks to a rigorous curriculum that “takes students from the fundamentals of aerodynamics, including basic mathematics, physics and materials science content, through more specific aerospace content that includes propulsion and structures for aerospace systems and the design of spacecraft,” says Mason Peck, the Stephen J. Fujikawa professor of astronautical engineering at Cornell and a former NASA chief technologist. A hallmark of the program is its project-based, experiential learning approach, in which student-led teams solve a research or design problem. “Our students do cradle-to-grave flight projects. They get to design, build, implement and operate spacecraft,” Peck says.

► [mae.cornell.edu](http://mae.cornell.edu)



Georgia Tech's  
campus in Atlanta

GEORGIA TECH

## GEORGIA TECH

### Daniel Guggenheim School of Aerospace Engineering

At Georgia Tech, students can select from specialized aerospace engineering course tracks that best fit in-demand career paths, including space systems, space entrepreneurship, propulsion, combustion, flight dynamics and drones. Coursework is supplemented through applied learning via co-op and internship opportunities as well as the school's active CubeSat program — which anticipates a launch in each of the next four years.

“It gives our students hands-on experience, so that when they go to the [job] interview, they can actually talk knowledgeably about space hardware,” says Mitchell L.R. Walker II, an aerospace engineering professor and associate chair for graduate programs.

► [ae.gatech.edu](http://ae.gatech.edu) ■

## THE FUTURE OF SPACE CAREERS

Founded in 1969 by the National Academy of Sciences, the nonprofit Universities Space Research Association (USRA) is a group of universities conducting leading research. The organization works with more than 100 member universities across the country to further scientific research and technology development on behalf of NASA, the Department of Defense, the National Science Foundation and other federal agencies as well as to promote careers in space.

USRA president and CEO Jeffrey A. Isaacson, who holds a doctorate in physics, shares insights on USRA's mission and what's on the horizon in space science:

### What do you see as the future of space and aeronautical science?

I think the most exciting thing right now has got to be space exploration. At the national level, we have articulated a plan to go back to the moon in a meaningful way and to operate there, outside of low-Earth orbit, as a stepping stone, so to speak, for greater human exploration of the solar system, beginning with Mars. USRA has supported research that will help achieve these goals of extended space exploration — including, for example, pioneering work on microgravity environments and enablers, like quantum computing.

Back on Earth, I like to point out to people that the first “A” in NASA is aeronautics. USRA is involved in work on urban air mobility. You can imagine a future where we're having things delivered by drones and using pilotless “air-taxis” to get around. It's cutting-edge research that I'm really excited about.

### What are the career prospects for students who go into space science, aeronautical engineering or related fields?

If there is anything standing in the way, it's just finding enough people (to fill openings). There are so many demands now for a technical workforce in this country. The space enterprise in the United States, and in the world, is literally burgeoning. We have new approaches and new suppliers — like Blue Origin and SpaceX and Virgin Galactic — that have upended the traditional government approach to space exploration. And, militarily, we've recognized the growing importance of space — so much so that we've created a new military branch, the Space Force.

The direction is very clear: There will be a strong, continued demand for workers with a knowledge of space science and engineering in our future.

### What opportunities are there at USRA?

An important part of our mission is workforce development — enabling and preparing the future space R&D (research and development) workforce. To that end, we manage a number of internships and related education programs for NASA and other federal agencies. Even in this, a pandemic year, we have more than 2,000 interns involved in those programs.

— Robin Roenker