

THE SKY ISN'T THE LIMIT!

HERE ARE YOUR CAREER
PATHWAYS TO AEROSPACE AND
ADVANCED MANUFACTURING



Bringing Industry and Education Together

www.listemhub.org



If you've ever stared at the sky in wonder on a clear, blue day or marveled at the power of an airplane charging down the runway...

If you've ever imagined building a better, more powerful aircraft or rocket booster...

If you love to figure out puzzles and tinker with new technology...

If you want to make the world a safer, smarter place ...

If you want to be prepared for thrilling jobs of the future...

Then this guide is for you!

Long Island is full of opportunities for young men and women with big dreams and an interest in science, technology, engineering, and math (STEM) to become the next generation of innovators in the aerospace and advanced manufacturing fields.



Use this guide to explore these fields, learn how you might fit in, and discover resources, camps, and even pre-professional internships designed to encourage your curiosity and launch your career!



Kids are born curious about how things work in the world around them—and the universe beyond. Parents & mentors: You can cultivate their interest in aerospace and manufacturing at every age with these resources.



Preschool

Trips to local science museums will build your kids curiosity and comfort with science. Give them space and range to explore (and resist the urge to give them too much instruction); following their instincts and learning through doing are foundational skills for future scientific skills!

Early Elementary School

Find a First LEGO League club—or start one of your own—to give your kids exposure to STEM concepts. Kids solve a real-world scientific problem with LEGOs and the help of grown-up coaches. Find out more at *firstinspires.org*



Advanced Manufacturing: A wide-ranging field in which employees use cutting-edge technology to improve products and processes that have high levels of design and help solve problems in society.



Aerospace: The field in which technology and industry intersect with both aviation (the operating of aircraft) and space flight, also known as astronautics.

Late Elementary and Middle School

Spend time at *mars.jpl.nasa.gov*, NASA's family-friendly hub for the Mars Exploration program, and at the Smithsonian's How Things Fly site *howthingsfly.si.edu* for compelling explanations of the physics behind flight. Then sign them up for summer camp at the Cradle of Aviation, whose annual programs cover topics relating to space, engineering, and robotics. Learn more at *cradleofaviation.org/education*

High School

Metro area colleges offer a wide range of extracurricular and summer programs in product design, engineering, robotics, coding, and other topics relevant to students with curiosity about aerospace and advanced manufacturing. Call the college or university closest to you and ask about options for your high schooler (and turn to page 20 for tips on where to start)!

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How To Use This Guidebook

This book is intentionally short and sweet because it's just a jumping-off point on your journey to a career you love. Let it spark your curiosity and guide your first steps toward discovering how you might fit into the aerospace or advanced manufacturing industries on Long Island.

Sponsored by the Long Island Community Foundation, this handbook was developed by The Cradle of Aviation Museum, STEM Advocates, and young professionals who have dedicated their time and energy to help students find their way to STEM and aerospace careers.

FUN FACTS

The earliest form of flight by man? Ballooning.

Manufacturers in the United States are the most productive in the world, far surpassing the worker productivity of any other major manufacturing economy.

Robots build many of the cars produced today. To work that innovation into the production of aircraft, developers are creating humanoid robots. Their human-like forms will "manufacturers hope" enable them to take jobs that are both tedious and dangerous for people to perform.

35 billion miles: The distance traveled by all Boeing 747s. That's equivalent to 75,000 trips to the moon and back.

Air travel is the second safest form of travel. The safest method is the elevator/escalator—but it's a bit tougher to get very far.

At any time, there are 61,000 people in the air over the United States and 1.5 million people in the air in the world.



Top 10 Reasons To Consider A Career in Aerospace or Advanced Manufacturing

When someone says, "Shoot for the moon!" you can honestly answer, "Yea, I already do that."

Because both aerospace and advanced manufacturing are on the cutting edge of technology, you can work on solving real problems—not just replicating or applying the same solutions again and again.

Defense jobs are abundant, as governments continue to find ways to protect their nations' borders and develop tools and technologies that put fewer and fewer active-duty men and women in direct harm. (Read: You can save lives.)

Job security is sky-high. (Get it? Sky high?)
Case in point: Some pros in these fields work at the intersection of electronics, communications, and satellite technology, and companies and even nations are dependent on advancement in these fields to bolster defense, improve telecommunications—and even predict the weather.

In the field of aerospace, the possible jobs are as diverse as Star Wars characters: Pilots, meteorologists, physicists, grand radio operators, aircraft mechanics, engineers, systems analysts, and statisticians are all employed in the aerospace industry. (And lucky for you, there are no Stormtroopers.)

Your Facebook posts about work will trump everyone else's Facebook posts about work.

Manufacturers in the U.S. perform two-thirds of all private-sector research and development in the nation, driving more innovation than any other sector.

You can help usher in the new era of air travel.
Even now, aircraft are being redesigned to reduce noise pollution and boost fuel efficiency, and this trend will continue indefinitely, driving the need for professionals in research and development.

The demand for pros who can create the complex software needed to help aircraft fly is very high. Software handles an ever-growing number of jobs done in the sky, and you can score a fun—and fascinating—job if you immerse yourself in the physics and computer technology that make air travel possible.

Your business card could say "NASA." Hello awesome!

Show Me the Money: Median Salaries for Aerospace and Advanced Manufacturing Jobs

Aerospace Engineer: \$105,380*

Aerospace Product & Parts Manufacturing: \$104,010*

Scientific Research & Development Services: \$111,330*

Commercial Airline Pilot: \$103,390*

Systems Analyst: \$82,710*

Airport Manager: \$55,983

Physicist or Astronomer: \$109,290*

Computer Hardware Engineer (Advanced Manufacturing): \$108,430

Graphic Designer: \$45,900*



Non-Techy Jobs In STEM Fields







Journalism

As science's influence grows, media outlets need reporters who can help average readers understand key developments.

Art and Graphic Design

Who makes an airline's marketing material? Who designs a manufacturing company's logo? Artists and graphic designers. Make yourself a strong candidate by taking some science courses in college to bolster your art curriculum.

Government

Lobbyists, policymakers, support staff, and advisors all have to have working knowledge of STEM fields, though rarely are these folks actually manufacturing robots or traveling to space. Experts say that candidates with a basic working knowledge of STEM concepts will have an advantage over those who do not.

*Data from the United States Bureau of Labor Statistics. Other salary data from payscale.com Visit sciencebuddles.org for more info about careers you didn't even know existed!

The Future Is Bright: Just Ask Bonny Simi, Vice President of Talent at JetBlue



A former pilot, Bonny Simi oversees the Talent Program at JetBlue, which includes developing talent pipelines in the Long Island community, hiring 3,000 crewmembers (JetBlue's term for employees) a year, and helping employees develop their careers. Here's her inside scoop on the aviation industry—and how you can be a part of it.

Q: How does a background in STEM play into careers in aviation?

A: An airline cannot operate without people who have STEM backgrounds. Of the 16,000 crewmembers at JetBlue, about 5,000 of them have STEM education or experience. That includes 3,000 pilots and dispatchers, 1,000 mechanics and engineers, 300 IT professionals, and about 700 other crewmembers in analytical roles.

O: We hear about airlines buying other airlines and the industry consolidating. So it seems like there's an oversupply of people who can do these jobs. What's the job outlook really like?

A: The airline industry is already feeling the shortage of pilots, in part because pilots must retire at age 65 and there aren't enough young pilots to replace them. One reason is that the cost to train a pilot is very high—more than \$200,000 to get the training and experience necessary to become an airline

transport pilot. The military is a great source of talent, but it's producing fewer pilots. Meanwhile, while the industry has consolidated, we're putting more aircraft in the air. For every plane that an airline buys, it needs to hire another 14 pilots to fly it, plus provide maintenance support.

O: So what's the future look like, for young people and for the airlines?

A: The entire airline industry has to work together to find less expensive ways for students to become pilots in particular. We expect some ab initio (Latin for "from the beginning") programs, which will allow smart young students to train specifically for one type of aircraft for a specific airline, leading to a safer pilot in a shorter amount of time with lower costs.

O: How does JetBlue support STEM and create pathways for students to become full-time employees?

A: We run a number of programs to help inspire and support young people interested in STEM careers. Through our JetBlue Foundation, we provide grants to schools to provide aviation education. Our goal is to reach 5,000 students in five years. We run outreach programs in local aviation schools, where pilots, technicians, and recruiters speak to students. In our pilot gateway program, we mentor students for eight years at a college and then at partner regional airlines until they become JetBlue pilots. And finally, we run an annual college internship program for roughly 30 university students, who spend eight weeks with us and learn everything from finance to operations and marketing to human resources. Once they complete the internship and graduate from college, they're eligible for full-time employment.

O: What's your best advice for young people interested in aviation or aerospace?

A: Now's a fantastic time to get into STEM courses that lead to an engineering, IT, or aviation degree. The industry is booming, and jobs will be available for many, many years to come.

The Future Starts NOW: Boost Your STEM Savvy on Long Island



Indulge your curiosity at any of these extracurricular and summer programs, designed to satisfy your interest and help you become the engineer, scientist, innovator, aviator, or astronaut of your dreams!

Bricks 4 Kidz Long Island North Shore

After-school programs and summer camps give you opportunities to build unique creations, play games, and have loads of fun using LEGO® bricks. The activities are designed to trigger your imagination and build self-confidence while you work on themes such as machines, outer space, the environment, and more. bricks4kidz.com

Brookhaven National Laboratory

This renowned lab hosts a wide range of fantastic programs for students; among them is the STEM-Prep Summer Institute, a four-week enrichment program for ninth-graders who are members of an underrepresented minority in sciences. If you participate, you'll get your hands dirty (in a good way!) on projects related to real-life research happening at the lab. Learn about all opportunities at

bnl.gov/education/students.asp

Cold Spring Harbor Laboratory

Did you know that Long Island is home to one of the world's first science center devoted entirely to public genetics education? Genes hold the secrets to life—and the more we know, the better we can treat disease and understand our health. Kick off your own genetics education with week-long summer workshops for middle and high school students and "Saturday DNA" classes, open to the public.



Hofstra University's STEM/STEAM Institute

Take STEM and add arts and design—and you get STEAM, which integrates the 3Rs with the 4Cs (collaboration, communication, critical thinking, and creativity). Arts education teaches you the integral skills needed to thrive in the 21st-century workplace. Hofstra summer camps and Saturday classes include innovative programs to help you prepare for this future. Visit *Hofstra.edu/academics/ce* and click "Youth and Pre-Collegiate Programs" for more info.



Long Island Science Center

Explore hands-on learning exhibits that pique curiosity and cultivate science-savvy at this Riverhead museum. Join the fun for Science Saturday and explore a new theme each week! lisciencecenter org



Mad Science of Long Island

Mad Science offers a range of flexible and affordable after-school programs designed for students in pre-kinder-garten through sixth grade. Fun hands-on activities spark students' interest in science. Parents can also arrange science parties at locations of their choice, where children discover objects that float through columns of air, marvel at the mystery of fireworks, see the power of static, and are amazed by the power of air pressure! madscienceli.com

Mathnasium Learning Centers

Mathnasium Learning Centers, the math-only learning center franchise with centers throughout Nassau County, specializes in teaching kids math in a way that makes sense to them. Students go to Mathnasium year-round to catch up, keep up, and get ahead in math. *mathnasium.com*

Science Museum of Long Island

On the Leeds Pond Preserve in Nassau County, the Science Museum of Long Island is a science activity center—full of enrichment workshops during the weekday and during school vacations. www.smli.org



Stony Brook University

Get a taste of the college experience at Stony Brook, which hosts a variety of exciting opportunities for high school students, ranging from residential summer camps in the sciences to credited summer courses that can jump start your college career. Stonybrook.edu/sb/highschool.shtml

Spotlight: The Westbury Magnet Academy at The Cradle of Aviation

In a very cool partnership with Westbury School District, 80 students attend school within a museum, with access to hands-on exhibits and artifacts that transform the classroom into a learning laboratory. These students take an accelerated science curriculum that includes a physics-first model, mathematics, robotics, aeronautics, astronomy, and history.

Here, students have learned about rocket propulsion through museum exhibits, conducted college-level physics experiments through a partnership with Adelphi University, met Tuskegee Airmen and African-American Air Force pilots, met Retired U.S. Air Force Pilot and Astronaut Buzz Aldrin, and participated in a live space chat with Astronaut Tracy Caldwell Dyson. What a great way to explore learning!

TIME TO EXPLORE! The Best Online Resources For You

K-5

Kinetic City - kineticcity.com

Ask Dr. Universe – askdruniverse.wsu.edu

Science Buddies – sciencebuddies.org

NASA Kids Club - nasa.gov/audience/forkids/ Tynker - tynker.com kidsclub/flash/index.html#.VnraFenfrLg

National STEM Video Game Challenge – stemchallenge.org

NASA Space Place - spaceplace.NASA.gov

Weather Wiz Kids - weatherwizkids.com

Tech Rocket - techrocket.com

Lifeboat to Mars - pbskids.org/lifeboat

Max and the Magic Marker - maxandthemagicmarker.com

Engineer Girl - engineergirl.org

9-12

EngineerYour Life – engineeryourlife.org

National STEM Video Game Challenge –

How Stuff Works - science.howstuffworks.com stemchallenge.org

Tech Rocket - techrocket.com

CSI Web Adventures - forensics.rice.edu

Connect To College



Long Island
colleges and
universities offer
a wide range of
exciting programs
for you! Launch
your career at
one of these
top-notch schools.

Dowling College, School of Aviation

Overview: Score a Bachelor of Science degree in either Aviation Management or Aerospace Systems Technology here, where your learning is bolstered by a strong liberal arts foundation. Grads go on to careers in commercial and military aviation, airports, air traffic control, and other areas of the air transport and the aerospace industries.

Program Highlight: The flight training is conducted at Brookhaven Airport, and students have access to a fleet of various Cessna and light sport aircraft. In addition to their training aircraft, FAA certified flight-training devices are used for providing simulation training. **Dowling.edu**

Farmingdale State College-SUNY, Department of Aviation

Overview: Here, you can earn a Bachelor of Science in Aeronautical Science – Professional Pilot or a Bachelor of Science in Aeronautical Science – Aviation Administration. The professional pilot program enables you to become a Certified Flight Instructor while earning advanced pilot ratings and building flight hours and twin-engine aircraft. Through the administration program, you can concentrate in airport management or air cargo management.

Program Highlight: Less than two miles from the main campus is Farmingdale State's Flight Center, a 22,000-square-foot facility that helps make Farmingdale State the largest collegiate flight school in the Northeast region.

Farmingdale.edu

"Aviation at the dawn of the 21st century will provide challenges and opportunities much like it did at its birth at the dawn of the 20th century. The rapid proliferation of unmanned aircraft, the next generation of air traffic management, increasing safety and security for the millions who will travel by air are but a few of these challenges requiring a new generation of aviation experts who will use science, technology engineering, and math to solve these challenges and provide new opportunities."

—Michael F Cander, PhD CFII, Aviation Director and Associate Professor, Farmingdale State College-SUNY



Hofstra School of Engineering

Overview: Choose from five degree programs in distinct engineering areas: biomedical, civil, electrical, industrial, and mechanical. All of them will equip you to be a problem-solver and creative-thinker who uses a technology to make the world a better place.

Program Highlight: Get real-world experience through the school's robust co-op and internship programs with corporations across the New York metro area. Bonus: The engineering department hosts the annual regional US FIRST high school robotics contest, in which students serve as team mentors. *Hofstra.edu*

New York Institute of Technology (NYIT)

Overview: With a broad selection of programs in engineering and computing sciences, NYIT is a good place to look if you're curious about the problem-solving and analytical aspects of the sciences but haven't yet nailed down your specific academic field.

Program Highlight: The school's mechanical engineering track grounds you in the design and development of mechanical systems, structures, thermo-fluid systems, aerospace systems, advanced transportation, and energy systems. You will learn to work in a variety of fields, including energy conversion, product design and development, manufacturing, construction, and research. You'll also have the option to choose a concentration in aerospace engineering, focusing on aircraft and space vehicle design. Bonus: NYIT offers a combined, five-year Bachelor of Science in Mechanical Engineering and Master of Science in Energy Management. This interdisciplinary curriculum combines an engineering background with leadership skills. Choosing this option saves time while you earn two degrees—and you gain a year of earnings potential. Score! *Nyit.edu*



Stony Brook University College of Engineering and Applied Sciences

Overview: Whether you aspire to be an applied mathematician, computer scientist, engineer, or technical project manager, the rigorous programs at Stony Brook are worth a very close look. The college offers 21 different undergraduate majors, minors, and accelerated-degree programs, so odds are you'll find just what you're looking for.

Program Highlight: If you're eager to conduct undergraduate research, here's good news: Stony Book offers several robust programs that will allow you to dive into your own project or participate in a project at nearby Brookhaven National Lab, which the university co-manages. **Stonybrook.edu**





Vaughn College of Aeronautics and Technology

Overview: Choose from a wide range of associate, bachelor, and graduate degree options and certificate programs in engineering and technology, management and aviation.

Program Highlight: Vaughn's new million-dollar flight simulator lab features the Redbirds, the most technologically advanced motion simulators available; the FRASCA 241, for training in both single and twin engine aircraft; a CRJ-200, which simulates the Canadair two-engine fan jet and is a great transition from the stationery FRASCA; and full-motion Redbird reciprocating engines to jet engines.

And if you're interested in AirTraffic Control, Vaughn College offers a collegiate partnership with the Federal Aviation Administration to equip you with the academic know-how to launch a career. *Vaughn.edu*



Build Experience with Internships and Apprenticeships

Good news! Many Long Island companies share a vision for equipping college students with the experience and skills necessary to be successful in the fields of aerospace and advanced manufacturing. Take the first step toward scoring an internship or apprenticeship by researching the companies on this list:

AAR Corp, Garden City | Aarcorp.com/careers

Provides aviation services to the worldwide commercial aerospace and government/defense industries.

General internships

Alken Industries, Ronkonkoma | Alkenind.com

Manufactures complex aircraft parts and assemblies for major aerospace companies.

General internships, engineering internships

Arkwin Industries, Inc., Westbury | Arkwin.com

Designs, engineers, manufactures, and supports hydraulic and fuel system components for the commercial aerospace, defense, maritime, and industrial markets.

General internships

Ausco, Farmingdale | Auscoinc.com

Manufactures miniature fluid-control components and systems for high-value, performance applications.

General summer internships

BH Aircraft Co, Inc., Ronkonkoma | Bhaircraft.com

Fabricates complex precision weldments and assemblies made of high-temperature alloys, which contribute to the integrity of structural and propulsion systems on commercial and military aircraft. *General summer internships*

CPI Aero, Edgewood | Cpiaero.com

Provides engineering, program management; supply-chain management; and maintenance, repair, and overhaul (MRO) services. *Structural mechanic internships*

Curtiss Wright Flow Control Company, Farmingdale http://www.cwfc.com/Careers/Careers.htm

Designs and manufactures highly engineered values, pumps, electronics, and related products for various markets including the commercial nuclear power industry and critical national defense programs. *General summer internships*

ExcelAire, Ronkonkoma | Excelaire.com

Private-jet charter firm that specializes in worldwide jet charters, and aircraft management, maintenance, and sales.

General internships, A&P internships, Ramp Control

Agent internships

GKN Aerospace, Amityville | Gkn.com/aerospace

Supplies high-value, integrated assemblies in both metallic and composite materials to the global aviation industry.

Apprenticeships and internships

GSE Dynamics, Hauppauge | Gsedynamics.com

Manufactures, assembles, and tests military mechanical and structural components and assemblies. *Informal general internships*

Hopscotch Air, Farmingdale | Flyhopscotch.com

Offers a true, affordable alternative to commercial air travel. *General internships*

JetBlue Airways, Long Island City | Work-here.jetblue.com Low-cost commercial airline that mainly serves destinations in the U.S. *General internships*

Lockheed Martin, Uniondale | Lockheedmartinjobs.com

Global security and aerospace company that researches, designs, develops, manufactures, and sustains advanced technology systems, products, and services. *General summer internships*

Northrop Grumman, Bethpage | Northropgrumman.com/jobs Global security company that develops innovative unmanned systems, cyber, C4ISR, and logistics. *General internships*

Pall Corporation, Washington | Pall.com

Materials science and engineering companies with broadest filtration, separation, and purification capabilities in the world for applications in health care, biotech, pharmaceutical, aerospace, and other markets. *General internships, R&D internship*

The Port Authority of New York and New Jersey, New York City Panynj.gov/careers

Conceives, builds, operates, and maintains infrastructure critical to the region's trade and transportation network.

Leadership Fellows Program; Engineering and Architecture
Internship; Accounting Training Program; General Summer
Internship; Audit Associates Program

Precision Gear, College Point | Precisiongearinc.com

Specializes in flight safety and critical products for aerospace, defense, and commercial applications.

General internship

Republic Airport, Farmingdale | Republicairport.net

A general aviation and reliever facility that serves the needs of corporate and light general-aviation customers.

General internships, Airport Management Internships

Seal Dynamics, Hauppauge | Sealdynamics.com/careers

Provides a diverse line of superior-quality products to the airline, OEM (original equipment manufacturer), and MRO (maintenance, repair, and overhaul markets.

General internships

5 Science Apps That Rock!



Sky View

Hold your iPad or iPhone up to the sky and the app identifies stars, planets, galaxies, and satellites—and allows you to track their movements. Bonus: The app requires no Wi-Fi, so you can even use it on boats and planes.



NASA App

Developed by—you guessed it—the brainiacs at NASA, this app contains more than 14,000 images and 10,000 videos of planets, stars, and satellites, along with info about all of NASA's current activities and missions. Bonus: You can even track the International Space Station!







Kid Weather

Designed by a six-year-old and his meteorologist father, the app teaches young kids basics about weather. You (or your kid sister) can calculate Fahrenheit and Celsius and learn weather-related trivia and vocabulary.



Solar Walk

To infinity and beyond! With this highly rated app, you can explore the solar system, learn about planets, get the scoop on space missions, and travel through space and time (at least, in theory). Bonus: This app offers 3D images that require 3D glasses (which aren't included).



Cargo Bot

Learn the basics of computer programming with this irresistible game, which will help you develop logical thinking skills while you solve puzzles.

What's the Difference?

Internships

Usually internships tend to be more general than apprenticeships. They usually give you a strong overview of a field, but they vary widely in how much hands-on experience they provide. Some internships are rich with skill-building experiences, while others are more observation-based.

Apprenticeships

More often than not, apprenticeships are often focused on highly skilled technical jobs and tend to be longer-term than the average internship. The work tends to be more hands-on, compared to an internship, and also usually pays more. And a final bonus: Apprenticeships more often lead to full-time employment because many firms that invest in apprentices use these programs as feeders for their full-time workforce.

Create a complete LinkedIn profile, even before you score an internship or apprenticeship. Afraid you don't have much to say? Start here: Write a killer summary that describes why you want to have a career in the aerospace or advanced manufacturing industries. Then include relevant coursework and any volunteer work you've done.





Long Island STEM Hub and Resources

The Long Island STEM Hub

Helping prepare students for the Long Island workforce through enhanced STEM experiences for students and teachers. Academic relevance is a major goal: We strive to make it easy for businesses to engage with school and university systems, and tap into non-academic settings such as museums, research labs, and not-for-profit programs. Our goal: promote workforce development to support the high-tech economic growth and vitality of the region. The Hub serves as a collaborative operation, providing a one-stop source for businesses, school districts, students, parents, teachers, universities, informal education and worker retraining operations to address STEM workforce needs in the region.



One of our organizational strategies is the creation of Regional Industry Councils (RICs) that comprise business, academic, and community stakeholders to identify the needs of industry and the best ways to meet those needs, particularly in high-growth STEM industries including:

- Energy & Environment
- Engineering & Architecture
- Manufacturing
- Aerospace

- Information Technology
- Healthcare & Life Sciences
- Global Business
- Homeland Security

Get more info! Visit *listemhub.org* for the scoop on events and other resources.



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www.listemhub.org

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