



Biomedical Engineering

This division provides engineering expertise and equipment that enhances crew performance, advances space-based research and ensures the health and safety of human space explorers.

Crew and Thermal Systems

Engineers design, test and develop technologies for environmental control/life support systems and active thermal control systems for spacecraft and spacewalkers. Test capabilities are available in vacuum and thermal/vacuum environments, including human test facilities.

Energy Systems

Engineering expertise is provided for human and human-supported spacecraft in propulsion systems, fluid systems, pyrotechnics, power generation and power distribution and control systems. The Energy Systems Test Area is a multi-facility complex that provides environmental test services for hardware evaluation and problem solving.

Structural Engineering

Engineers develop, evaluate and qualify space vehicle structures, mechanisms, thermal protection systems and passive thermal control systems. Space vehicles, space modules, mechanical systems and hardware are evaluated under launch, ascent, on-orbit, entry and landing environmental conditions using unique, world-class laboratories.



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University Research and Affairs Office

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Aerospace, biotechnology, robotics, neuroscience, planetary science—these are just a few of the fields in which universities can work with scientists and engineers at NASA's Johnson Space Center to further their research. Many universities are already working on collaborative research projects with NASA. The University Research and Affairs Office links the university community and the Center for synergistic science and engineering efforts. Joint research possibilities exist across the wide range of disciplines that comprise engineering and the space and life sciences. We invite you to explore working with us to further investigate mutual research interests. For more information visit <http://research.jsc.nasa.gov>

Engineering



Engineering

A seminal strength of Johnson Space Center has been and continues to be its engineering-based nucleus. From the Mercury and Apollo programs to today's International Space Station, the Center's engineering corps has played a major role in the design and development of spacecraft in support of the nation's human spaceflight programs.

Aeroscience and Flight Mechanics

Space engineering disciplines of aerodynamics and aerothermodynamics; guidance, navigation and control; and flight performance and mission design are applied to all phases of spaceflight and to spacecraft of all types.

Automation and Robotics

This division is responsible for the design, development, testing, and operations of intelligent systems, robotic systems, and real-time simulation systems that facilitate the Human Exploration and Development of Space.

Avionic Systems

This area specializes in designing, developing, testing and integrating electronic and software systems that comprise core spacecraft systems: command, guidance navigation, flight control, communications, tracking, instrumentation and data services.



Space & Life Sciences

To be the world's leader in understanding the space frontier and the opportunities, capabilities and limits of living and working there, NASA scientists at Johnson Space Center (JSC) conduct basic and applied research across the vast range of space and life sciences. This research is done using laboratories, microgravity environments and space-analog facilities across several disciplines including astrobiology, bioastronautics, biological sciences, and earth sciences.

Astrobiology

Astrobiology is the study of life in the universe. Scientists conduct peer-reviewed research in astrobiology and astromaterials across many basic scientific disciplines, including astronomy, astrophysics, planetary geology and planetary astronomy. Research goals are to understand the origin and evolution of the solar system and the nature and distribution of life in it. Astromaterials research labs include the Experimental Petrology Lab and Soil Chemistry and Mineralogy Laboratories. Apollo lunar samples, Antarctic meteorites, cosmic dust and space-exposed hardware are among the astromaterials stored and studied at JSC.

Biological Sciences and Applications

Scientists at JSC conduct flight- and ground-based cellular biotechnology research: molecular biology, molecular genetics, mammalian cell culture, immunology, tissue engineering and bioreactor (a NASA-developed device used to grow three-dimensional tissue) engineering studies. A major goal is to use the expertise and technology of NASA and its academic and commercial partners to advance tissue engineering to provide three-dimensional, functional tissue for research, transplantation and commercial applications.

Bioastronautics

Bioastronautics is the study of the biological and medical effects of spaceflight on human systems. Scientists work on new approaches for life sciences research that will result in effective countermeasures and innovative technologies to extend the duration and boundaries of human spaceflight.

Human Factors and Environmental Health

Scientists oversee and conduct applied research and advanced technology development to reduce health risks and increase astronaut productivity. This research includes studies on human factors and habitability systems, air and water quality, toxicology and microbiology, and radiation health. Research is conducted in many facilities, including the Acoustics, Microbiology, Radiation, Toxicology, Space Food Systems, Space Human Factors, and Water and Food Analysis laboratories.

Human Medical Research (Human Adaptation and Countermeasures)

The absence of gravity in an orbiting spacecraft leads to adaptive changes in the human body over extended periods. Scientists investigate the effects of microgravity on the human body and develop ways to maintain astronaut health in space and upon return to Earth.

Neuroscience

Scientists in the Neurosciences Laboratory are investigating the effects of spaceflight on the human nervous systems and developing countermeasures that may help in-flight and returning astronauts as well as patients on Earth who suffer from balance disorders and other related neurovestibular problems.



Nutrition

Nutrition is central to the health and safety of space explorers. Studies include nutritional requirements, nutritional content of space food, microbial monitoring and food packaging. These are just some of the issues that nutritionists at JSC oversee.

Pharmacology

Medications are an integral part of spaceflight. The Pharmacology Laboratory supports medical requirements for crews. Activities include clinical pharmacy services, pharmacokinetics and therapeutic monitoring.

Physiology

Extended spaceflight results in physiological adaptations to microgravity that may be detrimental to the human body including bone density loss, muscle atrophy, changes in the immune system, renal stone formation and cardiovascular changes. Scientists in these areas are studying the mechanisms of these changes and exploring countermeasures to prevent them.

Space Medicine

Medical and health care professionals insure the health, fitness and well-being of flight crews, their dependents and employees.

Biomedical Informatics

This emerging discipline involves the study, invention and implementation of structures and algorithms to improve communication, understanding and management of medical information.

Psychology and Behavioral Sciences

Psychology and behavioral research have been key parts of the space program since the selection criteria were developed for America's first astronauts. Operational psychology deals with providing psychological support to crews in space. Behavioral dysfunction can hamper astronaut training and upset crew interaction in space—especially on long-duration missions. Behavioral medicine focuses on behavioral health issues and clinical care for astronauts.

Earth Sciences and Image Science Analysis

Earth scientists manage a database of more than 500,000 images of our planet taken by astronauts in space since the early 1960s. Scientists analyze Space Shuttle and International Space Station mission imagery and research anomalies. They also conduct Earth science research and share this information with the public via the Internet at:

<http://eol.jsc.nasa.gov>

