



# NASA Subject Divisions and Categories Fact Sheet

## AERONAUTICS

### 01 Aeronautics (General)

Includes general research topics related to manned and unmanned aircraft and the problems of flight within the Earth's atmosphere. Also includes manufacturing, maintenance, and repair of aircraft. For specific topics in aeronautics see categories 02 through 09. For information related to space vehicles see 12 Astronautics.

### 02 Aerodynamics

Includes aerodynamics of flight vehicles, test bodies, airframe components and combinations, wings, and control surfaces. Also includes aerodynamics of rotors, stators, fans, and other elements of turbomachinery. For related information see also 34 Fluid Mechanics and Thermodynamics.

### 03 Air Transportation and Safety

Includes passenger and cargo air transport operations; airport ground operations; flight safety and hazards; and aircraft accidents. Systems and hardware specific to ground operations of aircraft and to airport construction are covered in 09 Research and Support Facilities (Air). Air traffic control is covered in 04 Aircraft Communications and Navigation. For related information see also 16 Space Transportation and Safety; and 85 Technology Utilization and Surface Transportation.

### 04 Aircraft Communications and Navigation

Includes all modes of communication with and between aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also 06 Avionics and Aircraft Instrumentation; 17 Space Communications, Spacecraft Communications, Command and Tracking; and 32 Communications and Radar.

### 05 Aircraft Design, Testing and Performance

Includes all stages of design of aircraft and aircraft structures and systems. Also includes aircraft testing, performance, and evaluation, and aircraft and flight simulation technology. For related information see also 18 Spacecraft Design, Testing and Performance; and 39 Structural Mechanics. For land transportation vehicles see 85 Technology Utilization and Surface Transportation.

### 06 Avionics and Aircraft Instrumentation

Includes all avionics systems, cockpit and cabin display devices, and flight instruments intended for use in aircraft. For related information see also 04 Aircraft Communications and Navigation; 08 Aircraft Stability and Control; 19 Spacecraft Instrumentation and Astrionics; and 35 Instrumentation and Photography.

### 07 Aircraft Propulsion and Power

Includes primary propulsion systems and related systems and components, e.g., gas turbine engines, compressors, and fuel systems; and onboard auxiliary power plants for aircraft. For related information see also 20 Spacecraft Propulsion and Power; 28 Propellants and Fuels; and 44 Energy Production and Conversion.

### 08 Aircraft Stability and Control

Includes flight dynamics, aircraft handling qualities, piloting, flight controls, and autopilots. For related information see also 05 Aircraft Design, Testing and Performance; and 06 Avionics and Aircraft Instrumentation.

### 09 Research and Support Facilities (Air)

Includes airports, runways, hangars, and aircraft repair and overhaul facilities; wind tunnels, water tunnels, and shock tubes; flight simulators; and aircraft engine test stands. Also includes airport ground equipment and systems. For airport ground operations see 03 Air Transportation and Safety. For astronomical facilities see 14 Ground Support Systems and Facilities (Space).

## ASTRONAUTICS

### 12 Astronautics (General)

Includes general research topics related to space flight and manned and unmanned space vehicles, platforms or objects launched into, or assembled in, outer space; and related components and equipment. Also includes manufacturing and maintenance of such vehicles or

platforms. For specific topics in astronautics see categories 13 through 20. For extraterrestrial exploration see 91 Lunar and Planetary Science and Exploration.

### 13 Astrodynamics

Includes powered and free-flight trajectories; orbital and launching dynamics.

### 14 Ground Support Systems and Facilities (Space)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and test chambers and simulators. Also includes extraterrestrial bases and supporting equipment. For related information see also 09 Research and Support Facilities (Air).

### 15 Launch Vehicles and Launch Operations

Includes all classes of launch vehicles, launch/space vehicle systems, and boosters; and launch operations. For related information see also 18 Spacecraft Design, Testing, and Performance; and 20 Spacecraft Propulsion and Power.

### 16 Space Transportation and Safety

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also 03 Air Transportation and Safety; 15 Launch Vehicles and Launch Operations; and 18 Spacecraft Design, Testing and Performance. For space suits see 54 Man/System Technology and Life Support.

### 17 Space Communications, Spacecraft

#### Communications, Command and Tracking

Includes space systems telemetry; space communications networks; astronavigation and guidance; and spacecraft radio blackout. For related information see also 04 Aircraft Communications and Navigation; and 32 Communications and Radar.

### 18 Spacecraft Design, Testing and Performance

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and spacecraft control and stability characteristics. For life support systems see 54 Man/System Technology and Life Support. For related information see also 05 Aircraft Design, Testing and Performance; 39 Structural Mechanics; and 16 Space Transportation and Safety.

### 19 Spacecraft Instrumentation and Astrionics

Includes the design, manufacture, or use of devices for the purpose of measuring, detecting, controlling, computing, recording, or processing data related to the operation of space vehicles or platforms. For related information see also 06 Aircraft Instrumentation and Avionics. For spaceborne instruments not integral to the vehicle itself see 35 Instrumentation and Photography. For spaceborne telescopes and other astronomical instruments see 89 Astronomy.

### 20 Spacecraft Propulsion and Power

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also 07 Aircraft Propulsion and Power; 28 Propellants and Fuels; 15 Launch Vehicles and Launch Operations; and 44 Energy Production and Conversion.

## CHEMISTRY AND MATERIALS

### 23 Chemistry and Materials (General)

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see categories 24 through 29. For astrochemistry see category 90 Astrophysics.

### 24 Composite Materials

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

### 25 Inorganic, Organic and Physical Chemistry

Includes the analysis, synthesis, and use inorganic and organic compounds; combustion theory; electrochemistry; and photochemistry. For related information

see category 34 Fluid Dynamics and Thermodynamics. For astrochemistry see category 90 Astrophysics.

### 26 Metals and Metallic Materials

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

### 27 Nonmetallic Materials

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see 24 Composite Materials.

### 28 Propellants and Fuels

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels. For nuclear fuels see 73 Nuclear Physics. For related information see also 07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power; and 44 Energy Production and Conversion.

### 29 Space Processing

Includes space-based development of materials, compounds, and processes for research or commercial application. Also includes the development of materials and compounds in simulated reduced-gravity environments. For legal aspects of space commercialization see 84 Law, Political Science and Space Policy.

## ENGINEERING

### 31 Engineering (General)

Includes general research topics related to engineering and applied physics, and particular areas of vacuum technology, industrial engineering, cryogenics, and fire prevention. For specific topics in engineering see categories 32 through 39.

### 32 Communications and Radar

Includes radar; radio, wire, and optical communications; land and global communications; communications theory. For related information see also 04 Aircraft Communications and Navigation; and 17 Space Communications, Spacecraft Communications, Command and Tracking; for search and rescue, see 03 Air Transportation and Safety; and 16 Space Transportation and Safety.

### 33 Electronics and Electrical Engineering

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. For related information see also 60 Computer Operations and Hardware; and 76 Solid-State Physics. For communications equipment and devices see 32 Communications and Radar.

### 34 Fluid Mechanics and Thermodynamics

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also 02 Aerodynamics.

### 35 Instrumentation and Photography

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see 43 Earth Resources and Remote Sensing. For related information see also 06 Avionics and Aircraft Instrumentation; and 19 Spacecraft Instrumentation.

### 36 Lasers and Masers

Includes lasing theory, laser pumping techniques, maser amplifiers, laser materials, and the assessment of laser and maser outputs. For cases where the application of the laser or maser is emphasized see also the specific category where the application is treated. For related information see also 76 Solid-State Physics.

### 37 Mechanical Engineering

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see 63 Cybernetics, Artificial Intelligence, and Robotics; and 54 Man/System Technology and Life Support.

### 38 Quality Assurance and Reliability

Includes approaches to, and methods for reliability analysis and control, quality control, inspection, maintainability, and standardization.

### 39 Structural Mechanics

Includes structural element design, analysis and testing; dynamic responses of structures; weight analysis; fatigue and other structural properties; and mechanical and thermal stresses in structures. For applications see 05 Aircraft Design, Testing and Performance; and 18 Spacecraft Design, Testing and Performance.

## GEOSCIENCES

### 42 Geosciences (General)

Includes general research topics related to the Earth sciences, and the specific areas of petrology, mineralogy, and general geology. For other specific topics in geosciences see categories 42 through 48.

### 43 Earth Resources and Remote Sensing

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis of remote sensing data and imagery; development of remote sensing products; photogrammetry; aerial photography; and Hydrology. For related instrumentation see 35 Instrumentation and Photography.

### 44 Energy Production and Conversion

Includes specific energy conversion systems, e.g., fuel cells; and solar, geothermal, windpower, and waterwave conversion systems; energy storage; and traditional power generators. For technologies related to nuclear energy production see 73 Nuclear Physics. For related information see also 07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power; and 28 Propellants and Fuels.

### 45 Environment Pollution

Includes atmospheric, water, soil, noise, and thermal pollution.

### 46 Geophysics

Includes earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see 47 Meteorology and Climatology; and 93 Space Radiation.

### 47 Meteorology and Climatology

Includes weather observation forecasting and modification.

### 48 Oceanography

Includes the physical, chemical and biological aspects of oceans and seas; ocean dynamics; and marine resources. For related information see also 43 Earth Resources and Remote Sensing.

## LIFE SCIENCES

### 51 Life Sciences (General)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance, of animals and plants in space and related environmental conditions. For specific topics in life sciences see categories 52 through 55.

### 52 Aerospace Medicine

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects of those environments. For psychological and behavioral effects of aerospace environments see 53 Behavioral Sciences. For the effects of space on animals and plants see 51 Life Sciences.

### 53 Behavioral Sciences

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

### 54 Man/System Technology and Life Support

Includes human factors engineering, bionics, man-machine systems, life support, space suits and protective clothing. For related information see also 16 Space Transportation and 52 Aerospace Medicine.

### 55 Exobiology

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see 52 Aerospace Medicine; on

animals and plants see 51 Life Sciences. For psychological and behavioral effects of aerospace environments see 53 Behavioral Sciences.

## MATHEMATICAL AND COMPUTER SCIENCES

### 59 Mathematical and Computer Sciences (General)

Includes general topics and overviews related to mathematics and computer science. For specific topics in these areas see categories 60 through 67.

### 60 Computer Operations and Hardware

Includes hardware for computer graphics, firmware and data processing. For components see 33 Electronics and Electrical Engineering. For computer vision see 63 Cybernetics, Artificial Intelligence and Robotics.

### 61 Computer Programming and Software

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

### 62 Computer Systems

Includes computer networks and distributed processing systems. For information systems see 82 Documentation and Information Science. For computer systems applied to specific applications, see the associated category.

### 63 Cybernetics, Artificial Intelligence and Robotics

Includes feedback and control theory, information theory, machine learning, and expert systems. For related information see also 54 Man/System Technology and Life Support.

### 64 Numerical Analysis

Includes iteration, differential and difference equations, and numerical approximation.

### 65 Statistics and Probability

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

### 66 Systems Analysis and Operations Research

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

### 67 Theoretical Mathematics

Includes algebra, functional analysis, geometry, topology, set theory, group theory and number theory.

## PHYSICS

### 70 Physics (General)

Includes general research topics related to mechanics, kinetics, magnetism, and electrodynamics. For specific areas of physics see categories 71 through 77. For related instrumentation see 35 Instrumentation and Photography. For geophysics, astrophysics, or solar physics see 46 Geophysics; 90 Astrophysics; or 92 Solar Physics.

### 71 Acoustics

Includes sound generation, transmission, and attenuation. For noise pollution see 45 Environment Pollution. For aircraft noise see also 02 Aerodynamics; and 07 Aircraft Propulsion and Power.

### 72 Atomic and Molecular Physics

Includes atomic and molecular structure, electron properties, and atomic and molecular spectra. For elementary particle physics see 77 Physics of Elementary Particles and Fields; for nuclear physics see 73 Nuclear Physics.

### 73 Nuclear Physics

Includes nuclear particles; and reactor theory. For space radiation see 93 Space Radiation. For atomic and molecular physics see 72 Atomic and Molecular Physics. For elementary particle physics see 77 Physics of Elementary Particles and Fields. For nuclear astrophysics see 90 Astrophysics.

### 74 Optics

Includes light phenomena and the theory of optical devices. For lasers see 36 Lasers and Masers.

### 75 Plasma Physics

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see 46 Geophysics. For space plasmas see 90 Astrophysics.

### 76 Solid-State Physics

Includes condensed matter physics, crystallography, and superconductivity. For related information see

also 33 Electronics and Electrical Engineering; and 36 Lasers and Masers.

### 77 Physics of Elementary Particles and Fields

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also 72 Atomic and Molecular Physics; 73 Nuclear Physics; and 25 Inorganic, Organic and Physical Chemistry.

## SOCIAL AND INFORMATION SCIENCES

### 80 Social and Information Sciences (General)

Includes general research topics related to sociology; educational programs and curricula.

### 81 Administration and Management

Includes management planning and research.

### 82 Documentation and Information Science

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer program documentation see 61 Computer Programming and Software.

### 83 Economics and Cost Analysis

Includes cost effectiveness studies.

### 84 Law, Political Science and Space Policy

Includes; aviation law; space law and policy; international law; international cooperation; and patent policy.

### 85 Technology Utilization and Surface Transportation

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see also 03 Air Transportation and Safety; 16 Space Transportation and Safety; and 44 Energy Production and Conversion. For specific technology transfer applications see also the category where the subject is treated.

## SPACE SCIENCES

### 88 Space Sciences (General)

Includes general research topics related to the natural space sciences. For specific topics in Space Sciences see categories 89 through 93.

### 89 Astronomy

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

### 90 Astrophysics

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

### 91 Lunar and Planetary Science and Exploration

Includes planetology; selenology; meteorites; comets; craters; and manned and unmanned planetary and lunar flights. For spacecraft design or space stations see 18 Spacecraft Design, Testing and Performance.

### 92 Solar Physics

Includes solar activity, solar flares, solar radiation and sunspots. For related information see 93 Space Radiation.

### 93 Space Radiation

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see 51 Life Sciences; on human beings see 52 Aerospace Medicine. For theory see 73 Nuclear Physics.

## GENERAL

### 99 General

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab; NASA appropriations hearings.

For assistance, contact the NASA STI Help Desk at [help@sti.nasa.gov](mailto:help@sti.nasa.gov) or 443-757-5802.