International Space Station
See it over your town!
http://spotthestation.nasa.gov/
International Space Station
By the Numbers

Spacecraft Mass: 924,739 lb
Spacecraft Pressurized Volume: 32,333 ft³
Velocity: 17,500 mph
Science Capability: Laboratories from four international space agencies
US, Europe, Japan, and Russia
NASA’s goals onboard the Station

- Advance benefits to humanity through research
- Enable a commercial demand driven market in LEO
- Enable long duration human spaceflight beyond LEO
- Basis for international HSF exploration partnerships
About 2000 science experiments have been conducted by researchers in 95 countries and areas.

During this expedition, about 250 experiments are occurring on-board.

Categories of space station research include: biology and biotechnology, Earth and space science, human research, physical sciences, education and technology demonstration.
Why microgravity?
Astronauts experience a spectrum of adaptations to spaceflight

- Neurovestibular
- Vision
- Cardiovascular
- Bone
- Muscle
- Immunology
- Nutrition
- Behavior
- Radiation

Cardiovascular deconditioning
Immune dysfunction
Muscle atrophy
Bone loss
Vision impairment
Female Astronaut:
- Women suffer less from hearing loss with advancing age, and do not display a bias towards loss of hearing in the left ear.
- Women demonstrate a slight bias towards accuracy versus speed in response to an alertness test.
- Women mount more potent immune responses.
- Women are more susceptible to orthostatic intolerance.
- Urinary tract infections are more common in female astronauts.
- Struvite kidney stones are more common in women.
- Large individual variability to muscle and bone loss in women.

Male Astronaut:
- Men suffer more from hearing loss with advancing age, and display a bias towards loss of hearing in the left ear.
- Men demonstrate a slight bias towards speed versus accuracy in response to an alertness test.
- Men mount less potent immune responses.
- Men are less susceptible to orthostatic intolerance.
- Urinary tract infections are less common in male astronauts.
- Calcium oxalate kidney stones are more common in men.
- Large individual variability to muscle and bone loss in men.
One Year in Space, Three Years of Data
Twin Study – Using integrated human -omic analyses to better understand the biomolecular responses to the physical, physiological, and environmental stressors associated with spaceflight.
Vision Impairment - Some astronauts’ vision deteriorates during spaceflight; this is an active area of research on the space station.
Fluid Shifts - Some astronauts’ vision deteriorates during spaceflight; this is an active area of research on the space station.
Growing Vegetables - Understanding the effects of gravity on plant life is essential in preparation for future exploration missions.
**CubeSats** – Cost-effective, independent means of getting commercial payloads in a variety of disciplines to orbit.
3D Printing – The ability to manufacture objects on-board a spacecraft is our first step in independence from Earth.
Rodent Research - Studies on model organisms are informing new pharmaceuticals for bone loss and other maladies.
Preventing Bone Loss - High intensity resistive exercise, along with adequate calorie intake and Vitamin D helps to prevent bone loss in space.
Fluid Behavior - Studies on liquid movement and surface tension are informing better spacecraft tanks and portable medical diagnostics on Earth.
Combustion - Studies on flame behavior and fuel mixtures on the space station may lead to improved fuel efficiency and reduced pollution on Earth.
Protein Crystal Growth - Improved structure of biological proteins grown in microgravity can lead to better pharmaceuticals on Earth.
Robotic Surgery - The development of robotic arms for space missions has led to computer-assisted devices specifically designed for neurosurgery.
Disaster Response Networks - The space station is a unique vantage point for observing the Earth with both hands-on and automated equipment.
Education - 42 million students and 25,000 schools in 44 countries involved in space station education activities.
Plant Growth - Technology developed for a space station greenhouse led to a new tool for eliminating airborne pathogens (like Anthrax) on Earth.
Benefits for Humanity Videos

• Robotic Surgery
  – https://youtu.be/LIWSyyT3w98
• Protein Crystal Growth
  – https://youtu.be/1jEx4Q_nBW8
• Remote Medicine
  – https://youtu.be/GhHe3oiLCo4
• Clean Drinking Water
  – https://youtu.be/DayWXWbVW4g
• Education
  – https://youtu.be/yzN9jSDKR8c
• Ship Tracking
  – https://youtu.be/TrsKZma-LTk
• Cooperation with EPA
  – https://youtu.be/w6XumQvbKag
http://www.nasa.gov/iss-science/

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Email List
https://lists.nasa.gov/mailman/listinfo/ iss-program-science-group

ISS Research Blog “A Lab Aloft”
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