# Class 9
# Space Stations

Prof. Keun Ryu
Turbomachinery Laboratory
Hanyang University, Korea

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# Space Stations

- Since 1971, space stations orbited Earth.
- Space stations are semi-permanent living quarters.
- They allow scientist to duct long-term studies in space.
- They also teach us how life in psace affects the human body.

# Skylab

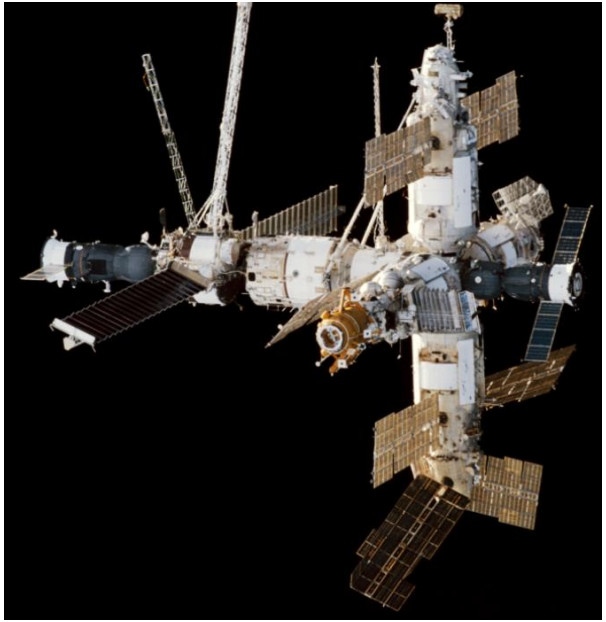
- Skylab was the first United States space station, launched by NASA, occupied for about 24 weeks between May 1973 and February 1974.
- It was operated by three separate three-astronaut crews: Skylab 2, Skylab 3 and Skylab 4.
- Major operations included an orbital workshop, a solar observatory, Earth observation, and hundreds of experiments.
- Unable to be re-boosted by the Space Shuttle, which was not ready until 1981, Skylab's orbit decayed and it disintegrated in the atmosphere on July 11, 1979, scattering debris across the Indian Ocean and Western Australia.

# Salyut

- The Salyut program was the first space station program, undertaken by the Soviet Union in 1971.
- There have been seven Salyut stations, lasting anywhere from a few days (Salyut 2) to nearly nine years (Salyut 7).
- Salyut 7 re-entered Earth’s atmosphere and burned up on February 7, 1991, ending the Salyut program.

# Mir

- Mir was a space station that operated in low Earth orbit from 1986 to 2001, operated by the Soviet Union and later by Russia.
- Mir was the first modular space station and was assembled in orbit from 1986 to 1996.
- It had a greater mass than any previous spacecraft. At the time it was the largest artificial satellite in orbit, succeeded by the International Space Station (ISS) after Mir's orbit decayed.
- The station served as a microgravity research laboratory in which crews conducted experiments in biology, human biology, physics, astronomy, meteorology, and spacecraft systems with a goal of developing technologies required for permanent occupation of space.



# Tiangong

- Tiangong is China's program to create a modular space station, comparable to Mir.
- This program is independent and unconnected to any other international space-active countries.
- China launched its first space laboratory, Tiangong-1, on 29 September 2011. Following Tiangong-1, a more advanced space laboratory complete with cargo spacecraft, dubbed Tiangong-2, was launched on 15 September 2016.

# ISS

- The International Space Station (ISS) is a modular space station (habitable artificial satellite) in low Earth orbit. It is a multinational collaborative project involving five participating space agencies: NASA (United States), Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada).
- The station serves as a microgravity and space environment research laboratory in which scientific research is conducted in astrobiology, astronomy, meteorology, physics, and other fields
- The ISS is suited for testing the spacecraft systems and equipment required for possible future long-duration missions to the Moon and Mars.

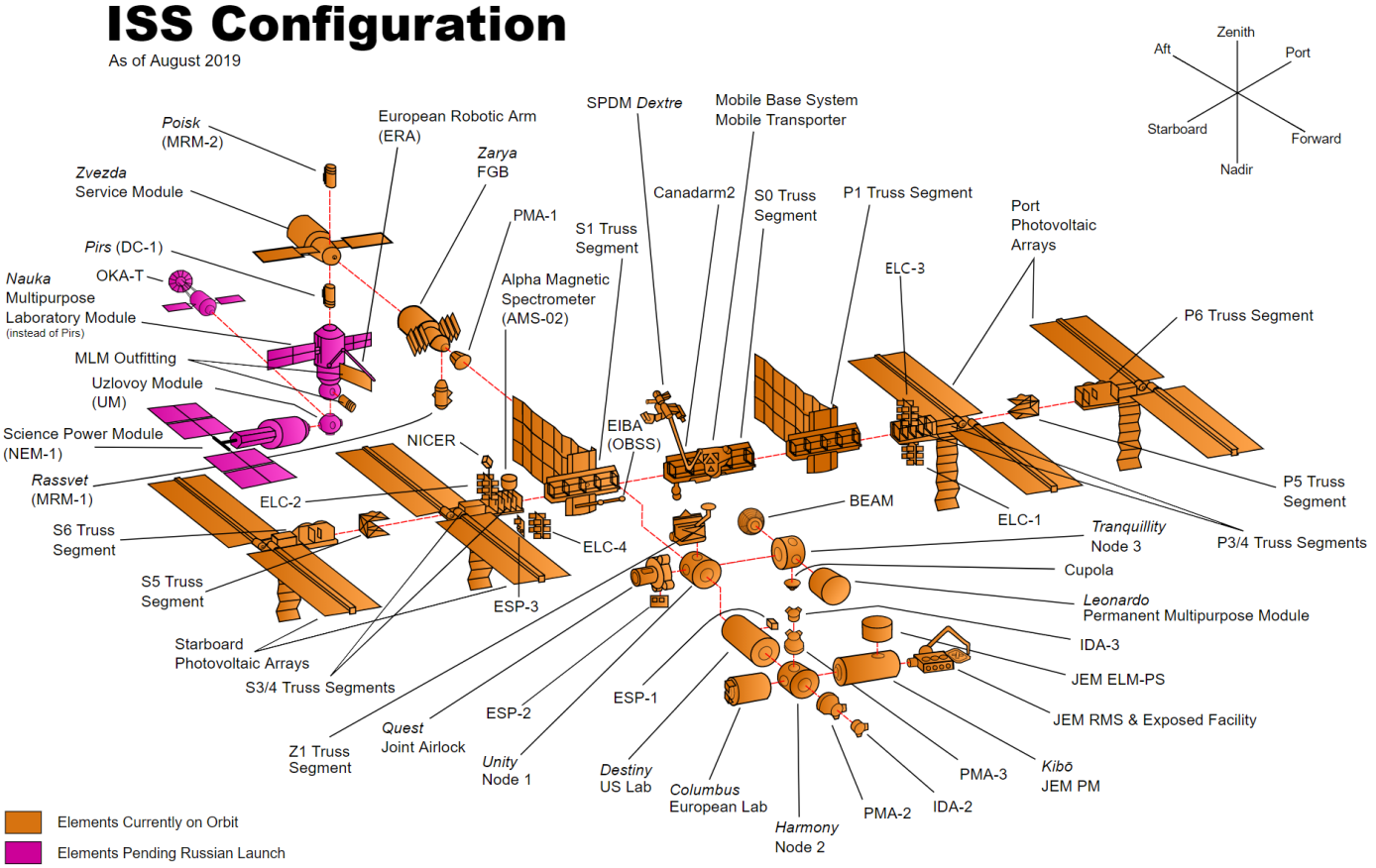
# ISS

- The ISS program evolved from the Space Station Freedom, an American proposal which was conceived in 1984 to construct a permanently manned Earth-orbiting station.
- It is the largest artificial object in space and the largest satellite in low Earth orbit, regularly visible to the naked eye from Earth's surface.
- It maintains an orbit with an average altitude of 400 km by means of reboost maneuvers using the engines of the Zvezda Service Module or visiting spacecraft.
- The ISS circles the Earth in roughly 93 minutes, completing 15.5 orbits per day.

# ISS

- The station is divided into two sections: the Russian Orbital Segment (ROS) is operated by Russia, while the United States Orbital Segment (USOS) is run by the United States as well as many other nations.
- The first ISS component was launched in 1998, and the first long-term residents arrived on 2 November 2000 after being launched from the Baikonur Cosmodrome on 31 October 2000.
- The station has since been continuously occupied for 20 years and 196 days, the longest continuous human presence in low Earth orbit, having surpassed the previous record of 9 years and 357 days held by the Mir space station.
- The latest major pressurized module, Leonardo, was fitted in 2011 and an experimental inflatable space habitat was added in 2016. Development and assembly of the station continues, with several major new Russian elements scheduled for launch starting in 2021.

# ISS



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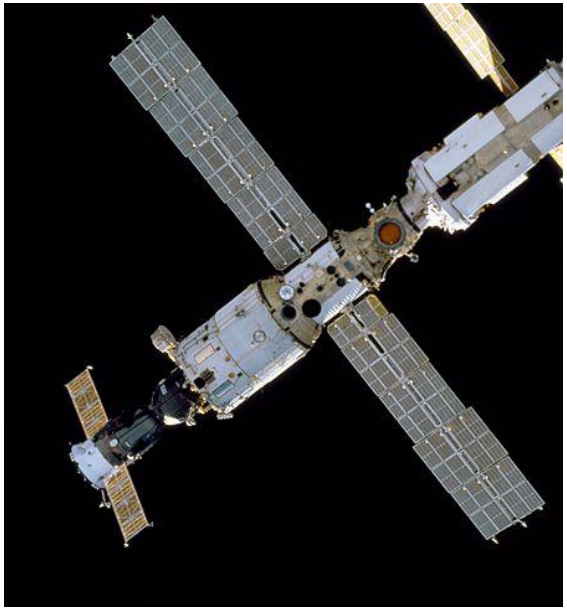
# Zvezda (ISS module)

- Zvezda, Salyut DOS-8, also known as the Zvezda Service Module, is a module of the International Space Station (ISS).
- It was the third module launched to the station, and provides all of the station's life support systems, some of which are supplemented in the US Orbital Segment (USOS), as well as living quarters for two crew members. It is the structural and functional center of the Russian Orbital Segment (ROS), which is the Russian part of the ISS. Crew assemble here to deal with emergencies on the station



# Summary

| | Skylab | Salyut | Mir | Tiangong | ISS |
|---|---|---|---|---|---|
| Launched | May 14, 1973 | April 19, 1971 | February 20, 1986 through April 23, 1996 | September 29, 2011 | November 20, 1998 |
| Ceased operation | July 11, 1979 | February 7, 1991 | March 23, 2001 | April 2, 2018 | Anticipated end date: 2028 |
| Operating country | USA | Soviet Union | Soviet Union/Russia | China | USA, Russia, Canada, Europe, Japan |


Thank you!