

**BEEP 2024, program of the course  
(small changes may occur).**

Course introduction: Human spaceflight: key challenges for the future of human exploration.  
Gabriele Mascetti, Italian Space Agency

**SECTIONS** (with titles of the lectures):

**A. Adaptive changes of human physiology in space**

- A.1 Physiology of extreme environments
- A.2 From Earth to Space: biomedical cardiovascular research through terrestrial space analogues
- A.3 Circadian rhythms in space.
- A.4 The eye in space: a very peculiar target.

**B. Cell and molecular biology. Experimental models**

- B.1 Experimental biology for space research (with laboratory exercise)
- B.2 Genomics on earth and in space
- B.3 Space for cancer research
- B.4 Hibernation, torpor and synthetic torpor: exploiting hypometabolism for space exploration
- B.5 Microbes from extreme environments to study space

**C. Life support systems. Food, shelter, health care.**

- C.1 Harvest on the Moon: Earthworms as biotools for lunar regolith pedogenesis
- C.2 Horticulture in space
- C.3 Moon colonization by humans: challenges and perspectives of 3D construction
- C.4 Telemedicine and robot assistance
- C.5 Pharmacology for space travel

**D. Experimental platforms in space and terrestrial analogs**

- D.1 How to do experimental biology in space
- D.2 Experimental platforms for gravitational biology from space agencies
- D.3 Microgravity V/S Hypergravity in biological research

Concluding remarks: Human space flight: the past, the present, the future. Paolo Nespoli, ESA Astronaut (ret.).