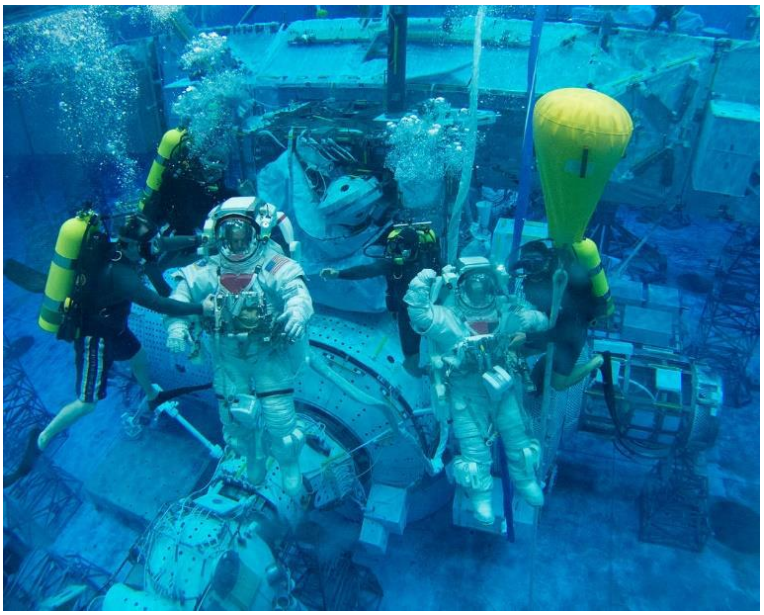
Mission: Diving to the ISS

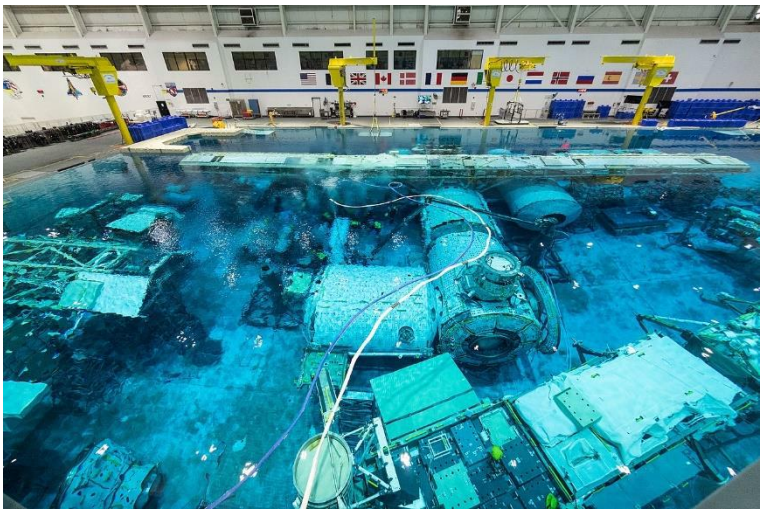
Underwater training for astronauts

Water and space are similar in one characteristic: the buoyancy that our body receives underwater is like the effect of weightlessness in space. Training underwater is therefore very similar to the feeling of weightlessness. Furthermore, in water, as in space, you must bring your own breathing air. For these reasons, astronauts must train underwater.

In the world's largest indoor swimming pool in Houston, USA, scale replicas of space station components are immersed for training purposes. The golden rule for astronauts is that every job in space, i.e. a mission outside the ISS, an extra-vehicular activity (EVA), undergoes seven to eight prior tests on Earth in this huge pool.

Before you take your class on this training mission for a spacewalk in the pool, show your students photos and videos of a real astronaut training underwater in the classroom. Discuss with your class the difference between training in the water and on land. Also discuss the similarities and differences between underwater training and the actual astronaut mission in space.





Here are links to videos of astronauts training underwater:

FR: https://www.youtube.com/watch?v=8KUMa9AC8C8&ab_channel=NatGeoFrance

ALL: https://www.dlr.de/next/desktopdefault.aspx/tabid-6857/11330_read-26193/

Materials (teachers) :

- At least 2 pairs of mittens for the children (e.g. ski mittens)
- 2 diving stones
- 2 diving hoops
- Laminated photo of the International Space Station
- Clothes pegs (one more than the number of students)
- swimming fries (half the number of students)

Materials (students) :

- Swimming goggles and swimming costume
- T-shirt and/or trousers that fit over the swimming costume (e.g. pyjamas) (Optional for young students)

Your task:

1) Warming up

In this exercise, children get used to the space gloves.

Divide the class into 2 teams and give each team a pair of gloves.

The first child in each team swims with the gloves to the other side of the pool and returns to give them to the next child in their team. The team in which all the children have swum back and forth first is the winner.

2) The external mission

It is now time for the astronauts' extravehicular mission. For such a mission, a whole crew is needed. The whole class forms the crew and is allowed to choose its own name.

First, everyone must put on their spacesuit. A proper spacesuit severely limits motor movements. To learn more about the spacesuit, you can watch this video.

The gloves and clothing over the swimming costume are intended to simulate the restriction of movement and mission
The gloves and clothes over the swimsuit are intended to simulate the restriction of movement and mission aggravation caused by the space suit. (For younger people, you can do this exercise without clothes or with just a t-shirt).

The mission: The ISS ground station reports a problem to the crew: the space station has a few loose objects, which absolutely must be repaired and reattached!

Preparation by the teacher before the mission: Not far from the edge of the pool, place a hoop of diving vertically into the water. This represents the pressure lock that astronaut must pass through to leave and enter the ISS. Further on, attach the laminated image of the ISS to the bottom of the pool with diving stones. You can also make the ISS float in the water if you attach it to a bucket containing a balloon, like the diving ring in this picture.

Now each child gets a clothes peg. The first child puts on the mittens, dives in
in the hoop, swim to the ISS, attach the clothes peg to the picture and return to the edge. It is important to hold the clothes peg firmly or to attach it to yourself, because anything that is not attached and gets lost disappears into space never to be seen again! The child puts the mittens back on and the second child leaves for the ISS. When all the clamps have been attached, you have completed this task. Remember that you are a team and if one of you can't do it, another team member can replace or help!

The crew has one more clamp than crew members, so one clamp can disappear into space. However, if more clamps are lost, the crew must repeat the training!

3) Back to the capsule

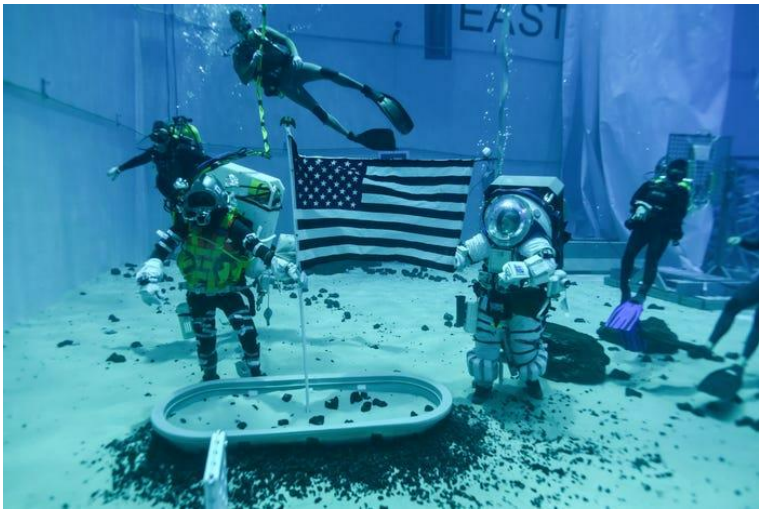
An EVA mission is usually carried out in teams of 2 astronauts, who must trust each other 100%.

In the final exercise of this mission, you must now return to the ISS in teams of 2. Form teams and each team takes a swimming fry. Each of the two team members stands at one end of the frit and the two swim a length of the pool. At the end of the length, another diving hoop, the pressure hatch, is placed underwater, through which the astronauts join the ISS. The first crew member dives and receives the fry from above the surface of the water from the second crew member. The second crew member also dives through the pressure chamber and both return to the ISS at the edge of the pool.

If you have all reached the edge of the pool, you have completed this astronaut training mission. Congratulations!

Comments and Feedback

We would be grateful if you could send us your comments or photos when you have completed this assignment, by email to contact@esero.lu.



In this picture you can see an underwater simulation of the lunar surface. For the lunar mission, the astronauts practiced raising a flag, picking up rocks and examining a spacecraft underwater.