

OUT OF THIS WORLD WITH HIGH SCHOOL PHYSICS EDUCATION (INTERNATIONAL SPACE STATION EXPERIMENTS)

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THE SWINBURNE YOUTH SPACE INNOVATION CHALLENGE

Using a novel approach to teaching physics, and space applications to senior high school students

The access to space has never been more affordable and so readily available than it is today, and the future job market for space related activities is growing exponentially. At Swinburne we are taking advantage of this to allow direct access to space for Australian high school students. Via the Swinburne Youth Space Innovation Challenge (SYSIC), students in years 10-12 are able to work alongside real researchers, university students and industry professionals to learn about space applications, microgravity experimentation and actively design and send an experiment for the International Space Station (ISS).

We've designed a specialty extra-curricular program to teach the foundations of space applications and access in two stages. The first stage is a 6-week micro-unit which is delivered via YouTube style 'lecture videos'. These videos draw upon the wildly successful science communication style of YouTube channels like Veritasium and Vsauce. Each week we cover different topics, ranging from the resources available in our solar system, to the intricacies of space law and the physics of microgravity. Alongside these videos, students work in teams to complete weekly mini challenges related to the weeks' theme. This has students researching historical and current space projects/events, as well as creating and innovating their own ideas to solve a problem presented. All while learning how to distill their findings to a wider audience as they share their responses via visual slides. They have support of weekly video mentor sessions with Swinburne staff and students.

In stage two of the program, the students move away from learning content, to creating their own. They are tasked with designing and pitching us their dream microgravity experiment. For this task they work to investigate past space-based experiments and how they could contribute to our understanding of physical processes in space. By the end of the program, each team has written, filmed and presented a polished science communication piece for judging. Judges range from industry professionals to active researchers. The winning team plays a leadership role in developing their idea further to send to the ISS, with all other teams also supporting the main project with their own innovation and contributions. Students participate in designing real-world research.

The 2021 challenge saw the students design an experiment around creating yogurt in space and students are currently working with samples from space in an at-school analysis kit we've provided.

We believe this program is the first of its kind in Oceania and is proudly led by a female management team.



Figure 1: 2021 student designed experiment aboard the ISS, shortly after deep freeze removal