

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
In Orbit: Postgraduate Space Education (4)

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RAISING AWARENESS OF ENGINEERING CAREERS IN THE SPACE SECTOR THROUGH  
PROJECT-ORIENTED DESIGN-BASED LEARNING

**Abstract**

The space industry is rapidly growing in many countries, including Australia. Industry growth requires skill development and an increase in training providers to fulfil emergent needs. The Space Industry Skills Gap Analysis published in 2021 by the Cooperative Research Centre (CRC) SmartSat identified 319 skills relevant to the Australian space sector, including technical, technology-specific, business, management, governance, and soft skills. Based on 90 valid organisational responses from public and private domains across the country, the study reports that Australia is well placed to support the latent space industry skills requirements, with 99% of the listed skills currently demonstrated. However, 310 (97%) of the identified skills are in short supply. While many universities in Australia already offer space-related programs, Deakin University has a strong tradition in advanced manufacturing (additive manufacturing), reusable energy, composites (carbon fibre), and simulation due to automotive and agricultural domain activities in the region. Many students enrolled at the Master's and Undergraduate levels in mechanical, mechatronics, electrical, civil, environmental engineering, and engineering management disciplines are not fully aware of the potential career opportunities in the space sector in Australia and internationally. This paper discusses a novel approach to introducing space careers to non-aerospace engineering students by engaging them with design problems relevant to their engineering discipline. Such an approach gives students agency and helps them understand how engineering skills and knowledge can be transferable to different industries, such as space, which they may have yet to come across as a viable career path. Engineering Design – SEM721 is a Project-Oriented Design-Based Learning (PODBL) subject offered in the Engineering Masters program and as an elective unit to year three and four Undergraduate students.

Since 2021, students enrolled in SEM721 have explored space-related design requirements through specific design challenges. In Trimester 3, 2023 (November 2023 - February 2024), 74 international and domestic students worked individually and in teams on the Human-Centred Design of Mars Habitat project. The students were encouraged to form interdisciplinary teams to diversify their skill sets. For instance, while civil engineering students focused on constructing the habitat or water management system, electrical students explored power generation, storage, and distribution for the provided scenario. The paper presents the challenges, learnings, and recommendations relevant to teaching and learning space-related topics to non-aerospace engineering students to familiarise them with the space industry. A collateral outcome of student engagement with space themes can inspire student exploration of potential sustainable terrestrial solutions.