

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
On Track: Undergraduate Space Education (3)

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A SUITABLE EDUCATION FOR THE (NEW) SPACE ECONOMY

**Abstract**

While more and more production and electrical engineering students opt for a combined degree, i.e., business or industrial engineering, this trend has yet to reach aerospace engineering. There was little need for a broad education beyond the confines of the respective disciplines, as traditional aerospace conglomerates had strictly divided finance and design departments and hierarchical structures. For a long time, start-ups in which employees necessarily take on multiple roles did not play a significant role in the space sector. With the emergence of New Space companies and, therefore, vertical integration in companies and more complicated financing models such as convertible bonds and Special Purpose Acquisition Companies, aerospace engineers must have a basic understanding of business and economics. Moreover, desperately needed finance or controlling specialists often find it challenging to gain access to the space industry without extensive training or prior experience in a related field, such as aviation or defense. Our course and teaching concept aims to change this mismatch between real-world requirements and education. It is aimed primarily at aerospace engineers and economics students.

Our undergraduate teaching approach is unique as we teach classical and modern economic theory with applications to space. As part of our course, students learn fundamental economic theories that help them to understand the market structure of the space industry. Students will build capabilities to then apply and modify these economic models to space and the space industry. Students can subsequently transfer solutions for economic problems on Earth to problems in space, e.g., space debris. Furthermore, we teach the basics of business valuation and equity financing. This way, we enable students to estimate the market value of space start-ups and assess financing options for different types of space ventures.

In large parts, we refrain from a classical lecture-style module and instead use the flipped classroom concept. We encourage students to work and discuss their results in interdisciplinary teams by providing them with case studies they analyze. With our experience and student feedback, we will develop and publish a text book specifically targeted at other lecturers for undergraduates to help them in two aspects. First, we connect economics theories with space and show how economic models can explain issues in space. Second, we provide numerous practical case studies and best practices for an interdisciplinary approach to engage undergraduate students.