A Physicist’s Perspective on Space Education

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UCL Space Week 2021: The future role of academia in the space sector
Timeline and Context

- **1975**: Ireland joins ESA
- **2000’s**: BSc degrees in Physics with Astro/Space
- **2013**: UCD MSc Space Science & Technology
- **2017**: EIRSAT-1 approved
- **2018**: Ireland joins ESO
- **2019**: Irish government publishes ‘Space Strategy for Enterprise’ (skills, jobs)
UCD MSc Space Science & Technology in a Nutshell

Engages students with the context, practices and methodologies of the rapidly evolving global space sector, equipping them to succeed in a wide range of roles.”

- Ireland’s only taught Space Masters programme
- Students from physics and engineering backgrounds
- Industry-oriented and practice-based curriculum
- 1 year duration, including a 12-week space sector internship
- ~90 graduates since 2014
- 21% female
Programme structure

Lectures
- Space Environment
- Applications of Space Science
- Options (e.g. remote sensing, planetary science, Python)

Hands-on
- Detector lab (incl. CubeSat)
- Space mission design
  - Concurrent design, international, interdisciplinary
  - Satellite subsystems

Career focus
- 3 month internship
- Professional skills
- Industry networking
Satellite Subsystems

• Teams design and build fully functioning experiment on ‘TupperSat’ platform, following space industry project life-cycle, ECSS standards

• Fly payload to 30km altitude on a weather balloon

• Track TupperSat and telemeter data to the ground station

• Develop skills in Space Systems Engineering, Python, CAD, 3D printing, electronics, communications, teamwork, testing, documentation, computational thinking, project management and more…
Roles of a physicist in the space sector

INSTRUMENTS, PAYLOADS & SENSORS
SYSTEMS ENGINEERING, AIT, PA, OPERATIONS
DATA PROCESSING, CALIBRATION, CONDITIONING
DEVELOPING PHYSICS-LED MODELS, ALGORITHMS, ANALYSIS PIPELINES

MAKING SENSE OF DATA, DATA SCIENTIST, DATA ANALYST
MACHINE LEARNING, AI
ASTROPHYSICIST, SPACE SCIENTIST, PLANETARY SCIENTIST, MISSION SCIENTIST, PRINCIPAL INVESTIGATOR
Graduate destinations
Emerging trends

- Traditional boundary between ‘upstream’ and ‘downstream’ no longer meaningful
- Space companies are data companies
- Reusability, COTS, accessibility
- Sustainability, space debris, night sky
- Making space for everyone
Key challenges for space education

- Can’t teach everything
- Diversify offerings
- Embedding space in other programmes e.g. sustainability, data analytics
- Mainstreaming space
The EIRSAT-1 Mission

Ireland’s first satellite
2U CubeSat 2.3kg / 2.2W

3 payloads
- Includes a gamma-ray detector for astrophysics

Environmental Test Campaign for EQM successful - Oct 2021

Aim to deliver Flight Model to ESA in 2022
Thank You!

www.eirsat1.ie
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