SSM
Scuola Superiore Meridionale

Course title: Introduction to Aerospace

Duration: 24 hours

PhD Program: SPACE

Name and Contact details of unit organizer:
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Course Description:
This course provides the fundamentals of aerospace engineering, with specific focus on space missions. Fundamentals of space missions, orbital dynamics, orbital maneuvers and space environment will be provided. The architecture of a typical space system and the relevant subsystems will be presented. Basics of applied fluid dynamics will be presented, with an introduction to gas dynamics and aerodynamics of aerospace systems. Fundamentals of space launch and propulsion systems will also be provided.

Syllabus:
1. History of space flight
2. Space mission architecture and components
3. Orbital Mechanics
4. Space Environment
5. Attitude control systems
6. Thermal and electrical power systems
7. Fundamentals of fluid mechanics
8. Gas dynamics and nozzles
9. Aerodynamics of aerospace vehicles
10. Rocket propulsion elements and classification
11. Space launchers and multi-stages

Assessment:
Project work + Written

Suggested reading and online resources:
Lectures slides
Charles D. Brown, Elements of Spacecraft Design, AIAA education series 2002, ISBN 1563475243;
James Richard Wertz, Wiley J. Larson, Space mission analysis and design, Volume 8, Springer, 1999, ISBN 0792359011;
G.P. Sutton, O. Biblarz O., Rocket Propulsion Elements, John Wiley & Sons Inc, 9th Edition, 2017, ISBN: 978-1118753651

John D. Anderson, Fundamentals of Aerodynamics, McGraw-Hill, 7th Edition, 2024, ISBN: 9781265926359