AEROSPACE ENGINEERING (LM52)

(Brindisi - Università degli Studi)

Insegnamento SPACE MISSION PROJECT AND SYSTEMS (MOD.2) C.I.

GenCod A006606

Docente titolare MICHELE GIANNUZZI

Insegnamento SPACE MISSION PROJECT AND SYSTEMS (MOD.2) C.I.

Insegnamento in inglese SPACE MISSION PROJECT AND SYSTEMS

Settore disciplinare ING-IND/05

Corso di studi di riferimento AEROSPACE ENGINEERING

Tipo corso di studi Laurea Magistrale

Crediti 6.0

Ripartizione oraria Ore Attività frontale: 54.0

Per immatricolati nel 2021/2022

Erogato nel 2021/2022

Anno di corso 1

Lingua

Percorso CURRICULUM AEROSPACE SYSTEMS

Sede Brindisi

Periodo Primo Semestre

Tipo esame Orale

Valutazione

Orario dell'insegnamento https://easyroom.unisalento.it/Orario

BREVE DESCRIZIONE DEL CORSO

The scope of the course is to present the complexity, critical aspects and opportunities of space missions and provide tools for their design.
The course will start with a brief history of space exploration, an introduction into main space missions before reviewing Orbital maneuvers.
It will present some basic characteristics of the space environment, robotic and human spacecraft and will introduce operational aspects of such vehicles.
It will also focus on some related onboard systems

PREREQUISITI

Bachelor level courses in physics, vector analysis, and calculus

OBIETTIVI FORMATIVI

The Space Missions and Systems (SM-S) module aims at giving the knowledge necessary to design space missions and systems. The course focuses on conceptual understanding of space mechanics, maneuvers, propulsion and control systems used in all spacecraft. The systems are then included in the broader concept of the space mission, which will be deeply analyzed by studying the mission architecture, its elements, and their relations. The student will gain knowledge of the challenges related to the use of the space environment as a scientific and utilitarian platform.

By the end of the course, the student must be able to: 1) Assess / Evaluate space mission goal and objectives; 2) Design mission to reach goal, and 3) Assess / Evaluate competing designs.

Moreover, the student will gain knowledge on communicate effectively with professionals from other disciplines.

METODI DIDATTICI	Lessons, exercises and workshops. **Delivery:** face to face **Learning activities:** Attending lectures and seminars. During the course, a design exercise is proposed, in which the students, divided into small groups, are asked to design different elements/systems of a space mission. The project work is, in effect, a project laboratory. Students apply the knowledge acquired in-class hours to design the assigned task. Various design support tools, such as physical modeling (i.e. FREECAD, FUSION360) and some mathematical modeling (i.e. MODELICA/PYTHON/ EXCEL), will be used for the different types of analysis provided. **Attendance:** Mandatory Teaching **Non-attending students info** Special arrangements may be made for non-attending students on a case-by-case basis. Such arrangements must be agreed upon with the instructor before thestart of the course.
MODALITA' D'ESAME	Learning is verified through an oral examination of the topics covered during the course: it will focus on theoretical arguments as well as on the content of the project work/exercises and on the contributions made by company testimonials, if applicable. Concerning the project work/exercises, the student is invited to present himself with his copy of the final report, of which he will be asked to discuss a part chosen by the teacher. The reports must be compulsorily submitted at the end of the course
PROGRAMMA ESTESO	- Types of space missions and their objectives. - General concepts of space vehicle architecture (spacecrafts, launchers, space stations, sub-orbital platforms) - Space environment - Applied orbital mechanics, including interplanetary trajectories and Rendez-vous in space.. - Launchers Market - Attitude determination and control - Onboard systems - Examples: Space Shuttle, Space Station, Tethered Satellite, the Hubble Space Telescope. - Key design systems for successful missions, in particular related to human spaceflight

TESTI DI RIFERIMENTO	Reference material prepared by the teacher and available on the course page on the teaching portal. The material is written in English. Some bibliography: - Space Mission Analysis and Design (SMAD), 3rd Edition, W.J. Larson and J.R. Wertz, Space Technology Library, Vol. 8 - Elements of Spacecraft Design, C.D. Brown, AIAA Education Series Mission Geometry; Orbit and Constellation Design and Management, - J.R. Wertz et alii, Space Technology Library, Vol. 13 Human Spaceflight; Mission analysis and Design, - W.J. Larson, Space Technology Series, McGraw Hill - ECSS standards (http://www.ecss.nl/) - NASA System Engineering Handbook, NASA/SP-2007-6105, Rev1.