SPACE FLIGHT DYNAMICS

SSD	CFU	Anno (I o II)		Semestre (I o II)		Lingua	
		I	II	I	II	Italiano	Inglese
ING-IND/05	9	✓			✓		✓

Insegnamenti propedeutici previsti: Nessuno

Classi				
Docenti				

OBIETTIVI FORMATIVI

The course is aimed at introducing the methods of space flight dynamics that are applied to real space systems. Starting from the basic knowledge acquired during the degree course, several topics will be covered in depth, including orbit perturbations analysis and propagation methods, orbit maintenance approaches, interplanetary trajectories, and advanced attitude control methods.
Special emphasis will also be given to the study of relative dynamics in space and its application to distributed space systems, and to autonomous rendezvous and docking in missions such as on orbit servicing and active debris removal.

PROGRAMMA Laurea

Orbit perturbations analysis:
- General and special perturbation techniques. Orbit propagation methods and tools
- Perturbations effects on different classes of Earth orbits

Orbit correction and maintenance
Orbit determination and estimation
Fundamentals of interplanetary trajectories
Relative motion in space
- Hill's equations and advanced mathematical models
- Formation flying, on orbit monitoring, rendezvous and docking
- Spaceborne collision avoidance strategies

Advanced attitude control methods:
- Gyro-based control methods
- Magnetic-based control methods

MODALITA' DIDATTICHE

Lectures, tutorials, exercises

MATERIALE DIDATTICO

Slides, lecture notes, technical papers.
Main textbooks:
D.A. Vallado, Fundamentals of Astrodynamics and Applications, 4th ed., Springer Space Technology Library, 2013.
R. R. Bate, Fundamentals of Astrodynamics, Dover Publications, 1972.
V.A. Chobotov, Orbital Mechanics, AIAA Education Series, 2002.
J.R. Wertz, Spacecraft Attitude Determination and Control, D. Reidel Publishing Company, 1978.
M.H. Kaplan, Modern Spacecraft Dynamics and Control, John Wiley and Sons, 1976.

MODALITA' DI ESAME

L'esame si articola in prova	**Scritta e orale**		**Solo scritta**		**Solo orale**	✓

In caso di prova scritta i quesiti sono	**A risposta multipla**		**A risposta libera**		**Esercizi numerici**	
Altro						