

## FLUIDODINAMICA SPAZIALE *modulo: SPACE EXPERIMENTS*

SSD	CFU	Anno (I o II)		Semestre (I o II)		Lingua	
		I	II	I	II	Italiano	Inglese
ING-IND/06	6		✓		✓		✓

**Insegnamenti propedeutici previsti: Nessuno**

Classi				
Docenti				

### OBIETTIVI FORMATIVI

This course is intended to provide an overview of the scientific and engineering problems related to the execution of experiments onboard space platforms, with particular reference to fluid dynamics aspects and to the current microgravity research. Topics include fundamentals of microgravity, study of fluids behaviour under reduced gravity conditions and related theoretical and numerical modeling. The subject is addressed from different perspectives, discussing past and present space programmes, as well as the experimental facilities available onboard space stations and spacecrafts.

### PROGRAMMA

Introduction to space utilization and overview of main scientific space programmes. Role of principal investigators, space industries and agencies. Historical perspectives of human space flight. Lessons learned. Space Agencies organization and activities. Current governative and commercial space programs. Motivations for research in microgravity. Overview of main research fields in Fluid, Material, Life Sciences and related applications. Short-duration microgravity opportunities: drop towers and drop tubes, parabolic flights on aircrafts, sounding rockets, orbital platforms. Fluid science fundamentals. Fluids and materials behaviour in space. Microgravity Fluid dynamics: capillarity, balance equations, order of magnitude analysis and examples. Buoyancy and surface tension-driven convection. Technological issues: containerless processing. The International Space Station (ISS). Pressurized and unpressurized elements. Accomodation and utilisation resources for payloads. Columbus laboratory. Microgravity facilities. Scientific operations. Ground Segment. Optical diagnostics for microgravity fluid dynamics.

### MODALITA' DIDATTICHE

Lectures, laboratory, seminars. Utilization of fluid dynamics software for specific exercises related to numerical simulation of fluids behaviour under reduced gravity conditions

### MATERIALE DIDATTICO

Slides, lecture notes related to Microgravity Sciences and International Space Station facilities and operations

### MODALITA' DI ESAME

L'esame si articola in prova	Scritta e orale	<input type="checkbox"/>	Solo scritta	<input type="checkbox"/>	Solo orale	<input checked="" type="checkbox"/>
In caso di prova scritta i quesiti sono	A risposta multipla	<input type="checkbox"/>	A risposta libera	<input type="checkbox"/>	Esercizi numerici	<input type="checkbox"/>
Altro	Discussion of exercises developed with personal computers					