Space mission design and operations

Summary
This course is a "concepts" course. It introduces a variety of concepts in use in the design of a space mission, manned or unmanned, and in space operations. It is at least partly based on the practical space experience of the lecturer.

Content

• Brief review of the fundamental laws of mechanics

• Types of space missions and their objectives.

• General concepts of space vehicles.

• The Space environment.

• Applied orbital mechanics, including interplanetary trajectories.

• Rendez-vous in space.

• Propulsion.

• Attitude determination and control.

• On board systems.

• Risk management.

• Examples: Space Shuttle, Space Station, Tethered Satellite, the Hubble Space Telescope.

• Extravehicular Activities.

• Future programs.

Keywords
• Space systems
• Space research
• Space exploration
• Space engineering
• Space operations

Learning Prerequisites
Required courses
• Bachelor level courses in physics, vector analysis, and calculus

Learning Outcomes
By the end of the course, the student must be able to:
• Assess / Evaluate space mission goal and objectives
• Design mission to reach goal
• Assess / Evaluate competing designs

Transversal skills
• Communicate effectively with professionals from other disciplines.
• Communicate effectively, being understood, including across different languages and cultures.

Teaching methods
28 hour course in the spring semester, out of which 12 hours are exercise hours, to reinforce the concepts explained in the course

Expected student activities
actively participate in the course and exercise sessions

Assessment methods
oral examination

Supervision
Office hours  Yes
Assistants  Yes
Forum  No

Resources
Bibliography
provided in the course introduction

Notes/Handbook
Course notes available before each course on Moodle

Websites

• http://www.nasa.gov
• http://www.esa.int

Moodle Link

• http://moodle.epfl.ch