Guia docent
205072 - 205072 - Recursos Espacials i Assentaments Planetaris

Última modificació: 19/04/2023

Unitat responsable: Escola Superior d'Enginyeries Industrial, Aeroespacial i Audiovisual de Terrassa
Unitat que imparteix: 758 - EPC - Departament d'Enginyeria de Projectes i de la Construcció.

Titulació: MÀSTER UNIVERSITARI EN ENGINYERIA AERONÀUTICA (Pla 2014). (Assignatura optativa).
MÀSTER UNIVERSITARI EN ENGINYERIA ESPACIAL I AERONÀUTICA (Pla 2016). (Assignatura optativa).

Curs: 2023 **Crèdits ECTS:** 3.0 **Idiomes:** Anglès

PROFESSORAT

Professorat responsable: IGNACIO CASANOVA HORMAECHEA

Altres:

METODOLOGIES DOCENTS

The course consists of lectures, personalized (and/or small group) tutorials, assignments, self-study and project preparation. During lectures, the instructor will offer theoretical concepts, and discuss reference materials. Homework will be assigned on a weekly basis in order to complement the content of lectures with practical exercises. Tutorials of small work groups will be carried out in order to monitor the progress of the elaboration of the final class project.

OBJECTIUS D'APRENENTATGE DE L'ASSIGNATURA

This course is designed as an advanced graduate study module for students with a strong background in the physical and/or engineering sciences, with the aim to provide an up-to-date perspective on current international efforts in the exploration and utilization of resources from space, and initiatives for the establishment of permanent (robotic and human) outposts on the surfaces of the Moon and Mars. Special attention will be put on developing criteria for a constructive and in-depth multidisciplinary analysis of reference mission definition. A complementary objective is to develop professional skills in the effective use of information and communication resources. The final class project will consist of a Case Study Analysis that will be presented in a variety of social network formats. Finally, guidelines and topic proposals will be provided to those students who express an interest in developing their Master’s Thesis Project on any subject related to the contents of the course.

HORES TOTALS DE DEDICACIÓ DE L'ESTUDIANTAT

Tipus	Hores	Percentatge
Hores aprenentatge autònom	48,0	64.00
Hores grup gran	27,0	36.00

Dedicació total: 75 h

CONTINGUTS

Week 1: An overview of solar system exploration

Descripció:
Brief history of Solar System exploration. Missions to the terrestrial planets and asteroids. Missions to the outer planets and their satellites.

Activitats vinculades:
Elaboration of a short report on the main technologies (instrumentation) used for planetary exploration and critical assessment of their performance.

Dedicació: 11h
Grup gran/Teoria: 4h
Aprenentatge autònom: 7h

Week 2: Resources from Near-Earth Space

Descripció:
What is a space resource?. The Moon: The Lunar regolith. Lunar oxygen production from crustal materials. Lunar ice. Near Earth Objects: review of asteroid compositions. Volatile products from carbonaceous asteroids. Mars and Beyond: Martian surface soils. Water on Mars. The Martian atmosphere. Martian satellites.

Activitats vinculades:
Report of categorization of different space resources according to their in-situ utilization potential

Dedicació: 11h
Grup gran/Teoria: 4h
Aprenentatge autònom: 7h

Week 3: Resources at orbital platforms

Descripció:
The International Space Station. Water recovery systems. Atmosphere. The Micro-Ecological Life Support System Alternative (MELiSSA) programme

Activitats vinculades:
Visit to the MELiSSA Pilot Plant at the Universitat Autònoma de Barcelona. Attendance required.

Dedicació: 11h
Grup gran/Teoria: 4h
Aprenentatge autònom: 7h

Week 4: Permanent planetary settlements: the Moon

Descripció:
Review of Lunar environmental conditions. Lunar construction. Science at and from the Moon. Sustainability and planetary protection issues. ESA's Moon Village project.

Activitats vinculades:
Short report on 1 concept (construction, science at/from, protection) and main requirements.

Dedicació: 11h
Grup gran/Teoria: 4h
Aprenentatge autònom: 7h

Week 5: Permanent planetary settlements: Mars

Descripció:
Review of Martian environmental conditions. The Mars Surface Reference Mission: A Description of Human and Robotic Surface Activities. Precursor Measurements Necessary to Support Human Operations on the Martian Surface. Assessment of NASA's Mars Architecture 2007-2016. Human Exploration of Mars Design Reference Architecture 5.0.

Activitats vinculades:
Short report on pros/cons of robotic vs. human exploration/settlement of/at Mars

Dedicació: 11h
Grup gran/Teoria: 4h
Aprenentatge autònom: 7h

Week 6: Case Study

Descripció:
Critical assessment of some specific proposal from industries and/or space agencies (instructor will provide necessary reference and data) or some advanced concept proposed by the students.

Activitats vinculades:
Generation of a report.

Dedicació: 20h
Grup gran/Teoria: 7h
Aprenentatge autònom: 13h

SISTEMA DE QUALIFICACIÓ