



Guía docente

205072 - 205072 - Recursos Espaciales y Asentamientos Planetarios

Última modificación: 19/04/2023

Unidad responsable: Escuela Superior de Ingenierías Industrial, Aeroespacial y Audiovisual de Terrassa

Unidad que imparte: 758 - EPC - Departamento de Ingeniería de Proyectos y de la Construcción.

Titulación: MÁSTER UNIVERSITARIO EN INGENIERÍA AERONÁUTICA (Plan 2014). (Asignatura optativa).

MÁSTER UNIVERSITARIO EN INGENIERÍA ESPACIAL Y AERONÁUTICA (Plan 2016). (Asignatura optativa).

Curso: 2023

Créditos ECTS: 3.0

Idiomas: Inglés

PROFESORADO

Profesorado responsable: IGNACIO CASANOVA HORMAECHEA

Otros:

METODOLOGÍAS DOCENTES

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.

OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

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.

HORAS TOTALES DE DEDICACIÓN DEL ESTUDIANTADO

Tipo	Horas	Porcentaje
Horas aprendizaje autónomo	48,0	64.00
Horas grupo grande	27,0	36.00

Dedicación total: 75 h



CONTENIDOS

Week 1: An overview of solar system exploration

Descripción:

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

Actividades vinculadas:

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

Dedicación: 11h

Grupo grande/Teoría: 4h

Aprendizaje autónomo: 7h

Week 2: Resources from Near-Earth Space

Descripción:

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.

Actividades vinculadas:

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

Dedicación: 11h

Grupo grande/Teoría: 4h

Aprendizaje autónomo: 7h

Week 3: Resources at orbital platforms

Descripción:

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

Actividades vinculadas:

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

Dedicación: 11h

Grupo grande/Teoría: 4h

Aprendizaje autónomo: 7h

Week 4: Permanent planetary settlements: the Moon

Descripción:

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

Actividades vinculadas:

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

Dedicación: 11h

Grupo grande/Teoría: 4h

Aprendizaje autónomo: 7h



Week 5: Permanent planetary settlements: Mars

Descripción:

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.

Actividades vinculadas:

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

Dedicación: 11h

Grupo grande/Teoría: 4h

Aprendizaje autónomo: 7h

Week 6: Case Study

Descripción:

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.

Actividades vinculadas:

Generation of a report.

Dedicación: 20h

Grupo grande/Teoría: 7h

Aprendizaje autónomo: 13h

SISTEMA DE CALIFICACIÓN