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| DENOMINACIÓN ASIGNATURA: Diseño de Sistemas Espaciales (Space Systems Design) | | |
| POSTGRADO: MÁSTER UNIVERSITARIO EN INGENIERÍA AERONÁUTICA Profesor/a: Filippo Cichocki | ECTS: 6 | CUATRIMESTRE: 2 |

| CRONOGRAMA DE LA ASIGNATURA (versión detallada) | | | | | | | | |
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| SEMANA | SESIÓN | DESCRIPCIÓN DEL CONTENIDO DE LA SESIÓN (En su caso, incluir las recuperaciones, tutorías, entrega de trabajos, etc) | GRUPO (marcar X) | | Indicar espacio necesario distinto aula (aula informática, audiovisual, etc..) | TRABAJO DEL ALUMNO DURANTE LA SEMANA | | |
| | | | 1 | 2 | | DESCRIPCIÓN | HORAS PRESENCIALES | HORAS TRABAJO Semana Máximo 7 H |
| 1 | 1 | Introduction to space systems design; description of space systems design project, subsystems overview | X | | | Personal study and project work. | 1.66 | 5 |
| 1 | 2 | Space Environment I; atmosphere and ionosphere, effects of vacuum, plasma and microgravity | | X | | Personal study and project work. | 1.66 | 5 |
| 2 | 3 | Space Environment II: sun radiation, magnetosphere, radiation effects and ECLSS | X | | | Personal study and project work. | 1.66 | 5 |



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| 2 | 4 | System Systems engineering I; introduction, TRL levels, project phases, V cycle | | X | | Personal study and project work. | 1.66 | 5 |
| 3 | 5 | Space Systems engineering II; requirements flow-down, management, verification and control, concurrent engineering, preliminary design phases | | X | | Personal study and project work. | 1.66 | 5 |
| 3 | 6 | Mission analysis I; basics of orbital mechanics, Tsiolkovsky's equation, orbital maneuvers | X | | | Personal study and project work. | 1.66 | 5 |
| 4 | 7 | Mission analysis II; groundtracks, repeating groundtrack orbits, space mission examples (LEO, MEO, GEO, interplanetary) | X | | | Personal study and project work. | 1.66 | 5 |
| 4 | 8 | Space Propulsion subsystem I | X | | | Personal study and project work. | 1.66 | 5 |
| 5 | 9 | Space Propulsion subsystem II | | X | | Personal study and project work. | 1.66 | 5 |
| 5 | 10 | Preliminary design tools; GMAT/STK (TBC) | X | | Computers | Personal study and project work (use GMAT/STK to solve project work). | 1.66 | 8 |



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| 6 | 11 | Electric Power Subsystem I | | X | | Personal study and project work. | 1.66 | 5 |
| 6 | 12 | Electric Power Subsystem II | | X | | Personal study and project work. | 1.66 | 5 |
| 7 | 13 | Attitude determination and control subsystem; review of attitude dynamics, introduction to ADCS, pointing budget, sensors and actuators | X | | | Personal study and project work. | 1.66 | 5 |
| 7 | 14 | Attitude determination and control subsystem; ADCS architecture and modes, RCS, control algorithm, RCS and RW control, ADCS examples | | X | | Personal study and project work. | 1.66 | 5 |
| 8 | 15 | Guidance, navigation and control in interplanetary missions | X | | | Personal study and project work. Study for quiz | 1.66 | 7 |
| 8 | 16 | Intermediate quiz | | X | | Personal study and project work. | 1.66 | 3 |
| 9 | 17 | Communications subsystem I | | X | | Personal study and project work. | 1.66 | 5 |



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| 9 | 18 | Communications subsystem II | X | | | Do lab report | 1.66 | 5 |
| 10 | 19 | Thermal control subsystem I | X | | | Personal study and project work. Voluntary homework. | 1.66 | 5 |
| 10 | 20 | Thermal control subsystem II | X | | | Personal study and project work. | 1.66 | 5 |
| 11 | 21 | Preliminary design tools; ESATAN | | X | Computers | Personal study and project work (use GMAT/STK to solve project work). | 1.66 | 10 |
| 11 | 22 | Spacecraft structures | X | | | Personal study and project work. | 1.66 | 5 |
| 12 | 23 | Spacecraft mechanisms | | X | | Personal study and project work. | 1.66 | 5 |



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| 12 | 24 | Preliminary design tools; IDM-CIC | X | | Computers | Personal study and project work (use IDM-CIC to solve project work). | 1.66 | 8 |
| 13 | 25 | GNSS systems | | X | | Personal study | 1.66 | 5 |
| 13 | 26 | Space launchers | | X | | Personal study and project work | 1.66 | 5 |
| 14 | 27 | Visit to ESAC + invited talk on ground segments and operations (TBC) | X | | ESAC center in Villanueva de la Cañada | Personal study | 3.00 | 0 |
| 14 | 28 | End-of-life considerations. Space Law. Course review | X | | | Personal study, prepare presentation of project | 1.66 | 5 |
| 15 | 29 | Projects presentation | X | | | Process presentation, obtain feedback and complete report | 1.66 | 5 |
| TOTAL HORAS | | | | | | | 49.50 | 151 |



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