

Space Summer Program

Syllabus 2020

Week 1 in Paris



Launchers System

Location:	ISAE-ESTACA Paris-Saclay
Objectives:	The purpose of this course is to be able to understand the system approach for the development of a launcher
Prerequisites:	Basis of mechanics and orbital mechanics
Contents:	<ul style="list-style-type: none">- Bases on mission and architecture of a launcher,- Propulsion systems principles,- Guidance and control algorithms and equipment- Workshop for evaluation.
Details on the Workshop:	2 exercises will be proposed: <ul style="list-style-type: none">- Sizing of the gambling angle and speed of a launcher's engine during the 1st stage flight, with atmospheric part, and of the corresponding simplified control law.- Sizing of the gambling angle of a launcher's engine after the 3rd stage separation, without atmosphere, and of the corresponding simplified control law.
Duration:	4 sessions of 3 hours (class) + 1 sessions of 3 hours (Workshop) + 2 visits in Airbus Defence &Space and Dassault Sysems
Professors from ArianeGroup:	Alain Dufour, Gerald Pignie, Charles Vallet, Didier Gignac
Bibliography:	Given on the courses supports
Evaluation:	Attendance and exercises evaluation

Week 2 in Poitiers



Radiative Heat Transfer applied to Thermal Control of Satellites

Location:	ISAE-ENSMA
Objectives:	The purpose of this course is to simulate and control thermal behavior of satellite during its life
Prerequisites:	Basis of conductive and radiative heat transfer
Contents:	Generalities on radiative heat transfer, Monte-Carlo simulation, instationary heat transfer from nodal description, orbital description, thermal control strategies by using heat pipes.
Duration:	1 session of 3 hours (class) + 2 sessions of 3 hours (lab works) + 4-hour Small Sat Workshop + conference from Airbus Defense and Space
Professors:	Gildas Lalizel
Bibliography:	Spacecraft Techniques and Technology, CNES, CEPADUES EDITIONS.
Evaluation:	Quiz on the Cubsat thermal simulation lab works

Week 3 in Toulouse



Introduction to Project Management in Aerospace Programs

Location:	ISAE-SUPAERO Toulouse
Objectives:	The module offers the space summer students the opportunity to get an introduction to Project Management within Aerospace Programs. Basic tools of Project Management are taught (WBS, OBS Gantt, Cost, Risk Management) and illustrated in Aerospace Programs.
Prerequisites:	2 nd year of Bachelor in Science or Engineering
Contents:	<p>What is Project Management?</p> <ul style="list-style-type: none">- Technical aspects- Organization aspects- Human aspects <p>What is a project ?</p> <ul style="list-style-type: none">- Objective QCD- Types of projects- Phases and Milestones <p>Roles and responsibilities within a project organization</p> <ul style="list-style-type: none">- Sponsors and Steering Committee- Project manager and project team <p>Technical aspect in project management</p> <ul style="list-style-type: none">- WBS- PERT and Gantt- Workload- Cost management- Risk management <p>Feedback and lessons learned from a real aerospace project</p>
Duration:	Five 3-hour lecture sessions plus 1-day workshop
Coordinator:	Prof. David Mimoun
Bibliography:	<p>NASA Space Flight Program and Project Management Handbook</p> <p>NASA systems engineering handbook</p> <p>Aircraft Design Project (Lloyd Jenkinson, Jim Marchman)</p> <p>Aviation Project Management (Dennis Lock and Triant G. Flouris)</p>
Evaluation:	Written exam

Week 4 in Salon de Provence



Space Military Applications

Location:	École de l'Air – Salon de Provence Located in the very heart of Provence, the “École de l'air” is the only French Academy dedicated to the training of the future officers of the French Air Force.
Objectives:	This course gives an overview of the applications of space, focusing on military ones. The aim is to study both geopolitical and technical aspects of satellite systems. All major fields are addressed: telecommunications, ground observation, and space monitoring. The final aim is to realize the preliminary design of a small remote sensing satellite taking into account a product specification. It also includes several technical and cultural visits.
Prerequisites:	Mathematics and signal processing basics
Contents:	Geopolitical issues in space Space surveillance Space communications, Remote sensing Continuous teamwork: study of a space system Visit of Thales Alenia Space facilities in Cannes Free time in Cannes Cultural visits (wine producer and soap producer)
Duration:	12 hours (plus the 4-hour Small Sat Workshop)
Coordinator:	Captain Corentin JIMENEZ and Major Georges LAURENT
Bibliography:	Satellite Communications Systems, G. Maral & M. Bousquet, Wiley 2010 Remote Sensing: Models and Methods for Image Processing, Robert A. Schowengerdt, Academic Press 2006
Evaluation:	Multiple-choice questionnaire and oral presentation