High-Level Postgraduate Advanced Course in Aerospace Engineering

Established by

Italian Ministry of Foreign Offices
Directorate General for Development Cooperation
Task Force Iraq
(Min. Massimo Bellelli)
And
School of Aerospace Engineering
(Prof. Filippo Graziani and Paolo Teofilatto)
The Promoters

Cooperazione Italiana allo Sviluppo
Ministero Affari Esteri

General Direction for Development Cooperation

Exigui numero sed vivida virtus
The Aeronautical time
from the airship to airplane (1926-1950)
(Aeronautical Engineering laurea course)

Direzione Superiore Studi ed Esperienze Guidonia (1935-1943)
The Aerospace time
from the rocket to the satellite (1957-2010)

(Aerospace Engineering laurea course)
San Marco project (1960-1988),
Centro Ricerche Aerospaziali (Urbe Airport),
Broglio Space Center (Malindi, Kenya)
Since 1990 an educational program has been established at the Scuola di Ingegneria Aerospaziale for didactical purposes

The tradition of manufacturing and launching satellites is still continuing at the Scuola di Ingegneria Aerospaziale even if in smaller “scale”. The Gruppo di Astrodinamica dell’Università degli Studi “la Sapienza” (G.A.U.S.S.) has promoted since the early 90’ the UNISAT Program for educational purposes in order to involve directly the students in the design and realization of “university microsatellites” launched from the Baikonour (Kazakhstan) cosmodrome using the DNIEPR L.V.. A Space Debris optical observations program (SPADE Program) is also operative. A space culture dissemination in the High-School has been promoted for six years in the ALERE FLAMMAM Program by the course “Astronautica in Classe”.
A short history of UNISAT program

1990 - Theoretical studies on building low-cost microsatellites at university
   A few people trusted it was possible that students could design and manufacture microsatellites using commercial off-the-shelf components

1995 - First founding of UNISAT program from Italian Ministry of University
   Building of ground station (SPIV)
   2 young researchers of University of Rome at Stanford University

1997 - Starting design and manufacturing of UNISAT

2000 - Launch of UNISAT

2002 - Launch of UNISAT-2

2004 - Launch of UNISAT-3

2006 - Launch of UNISAT-4

2011 - Launch of EDUSAT_it
UNISAT microsatellites

Unisat
26 September 2000

Unisat-2
20 December 2002

Unisat-3
29 June 2004

Unisat-4
26 July 2006
AFTER THE LAUNCH
EduSat

Educational Satellite for High School Students

Payload designed by high school students:
• Temperature sensor
• Sun sensor (manufactured by IMT)
• Solar Pannel
• Electronic device to storage data

Successfully launched August 17, 2011
from Yasny L.B. by DNEPR L.V.

Financial support by Italian Space Agency (ASI)
Cubesats at School of Aerospace Engineering

- Morehead – Roma Fempto Orbital Deployer
- To be tested on EduSat launch
- Two pocket-cubes realised by students from an Italian and a Slovenian high school

The UniCubeSat of the Scuola di Ingegneria Aerospaziale:

launched in the Vega Maiden Flight February 17, 2012
Objectives of the Course

- **The specific area of interest is that of microsatellites**, where the School of Aerospace Engineering of Rome boasts a considerable experience. Through the classes focused on theoretical aspects of aerospace engineering and through the practical activity in the School laboratories, each student will be finally able to contribute in the building a microsatellite with a weight up to 10 kg), with the perspective of launching and inserting it in orbit.

At the end of the graduate-level course, each student will be able to:
- contribute to design not only aerospace systems but also robotic and automatic systems, even in the context of industrial processes control
- contribute to several space mission tasks, such as ground support, satellite telemetry and tracking, signal and data processing
- support the transfer of technological solutions of aerospace engineering to alternative contexts, such as civil and mechanical engineering
- acquire software competencies in scientific and design tools such as Cad, Catia, Matlab, Simulink, which are widely used by the scientific community all over the world
- organize and manage contacts with other people and institutions that share the same interests in aerospace engineering, possibly in the context of international work groups
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<tr>
<th>CYCLE 1 - (16 credits)</th>
<th>May 20, 2012 - July 8, 2012</th>
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<tbody>
<tr>
<td>Space Missions for Telecommunications and Earth Observation</td>
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<td>Flight Mechanics Laboratory</td>
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<th>CYCLE 2 - (credits 16)</th>
<th>September 3, 2012 - 21 October, 2012</th>
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<tr>
<td>On board Electronics</td>
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<td>Electronics Laboratory</td>
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<th>CYCLE 3 - (16 credits)</th>
<th>January 7, 2013 - February 24, 2013</th>
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<td>Space Power Systems</td>
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<td>Power System Laboratory</td>
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<th>CYCLE 4 - (credits 16)</th>
<th>February 25, 2013 - April 14, 2013</th>
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<td>Attitude Control</td>
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<td>Aerospace structures and Thermal Analysis</td>
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<th>CYCLE 5 - (credits 12)</th>
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<tr>
<td>Telecommunications and Earth Observation Systems</td>
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<td>Attitude Control Laboratory</td>
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<td>Or</td>
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<td>Optical Sensor Laboratory</td>
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<th>CYCLE 6 - (credits 10)</th>
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<tr>
<td>Space Structure Laboratory</td>
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<td>Or</td>
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<td>Ground Station and Telecommunications Laboratory</td>
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Cultural Visits

- June 2, 2012: Roman Forum
- June 16, 2012: Celio e Aventino
- June 30, 2012: Roma Barocca
- July 7, 2012: Villa Adriana
- September 22, 2012: Florence
- October 13, 2012: Tusculum

- October 2, 2012: 65° International Astronautical Congress, Napoli
- October 4, 2012: 65° International Astronautical Congress, Napoli
- February 1, 2013: CIRA, Capua
- March 11, 2013: Thales Alenia Space, via Tiburtina, Roma
- April 15, 2013: MBDA Italia, Fusaro Plant
- May 13, 2013: Telespazio, Fucino Plant
- June 10, 2013: Italian Space Agency, Roma
Final Comments

- Traditionally, the educational programs of the School of Aerospace Engineering are strongly coupled with the technology development and experimental activity.
- The manufacturing of a microsatellite allows the students to have a full view on a concrete project, thus developing their skill as System Engineers.
- With the fundamental support of the DGCS – Task Force Iraq the educational program of the School of Aerospace Engineering is offered to 15 students from Iraq.
- Generally cooperation effort is devoted to the support in areas of emergency and first aid. On the other hand this course is an important example of the cooperation between Italy and emerging countries in the field of high education and training in a sector, such as aerospace engineering, which is strategic for the technology development in the medium/long term.
- This activity is finalized to the development of an Aerospace College in Iraq also with the aim to spread the know how of aerospace engineering in a large area of the arabic world.
- This project can be regarded as an example to promote similar activities between the School of Aerospace Engineering of Rome and other emerging countries.