

Master in Satellites and Orbital Platforms

Director Prof. Paolo Gaudenzi

DIPARTIMENTO DI INGEGNERIA
AEROSPAZIALE E ASTRONAUTICA



SAPIENZA
UNIVERSITÀ DI ROMA

Paolo Gaudenzi

Università di Roma la Sapienza, Master in Satellite Systems and Services

Anthony Kiroe

Università di Roma la Sapienza and Yomo Kenyatta University

Training experience in Italy under the cooperation Agreement between Kenya and Italy

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ASI and University of Roma la Sapienza in a joint effort for education and training

- In the frame of the intergovernmental agreement between Italy and Kenya, under the Italian Space Agency management, a specific training programme in space has been developed in collaboration with the University of Roma La Sapienza and Kenyan partners.
- In 2008 ASI and University La Sapienza agreed to jointly develop a training programme of 18 months, in which three Kenyan researchers, selected by the Kenyan Government, attended the Master in Satellites and Orbital Platforms of La Sapienza.
- The University di Roma La Sapienza is active in aerospace activities since the early 20's, when the Scuola di Ingegneria Aeronautica was founded in 1926. Since then many scientific findings and research projects were developed, including the San Marco project founded Prof Broglio and the space activities in the launching base in Malindi Kenya in cooperation with Kenyan Government.
- Now 1500 students are attending Aerospace Engineering courses at la Sapienza and many Science Departments are also involved in Space Research activities.
- Since 2002 the University di Roma La Sapienza offers the professional Master in Satellites and Orbital Platforms, based on one year, six months of classes and six months of stage experience.

Implementation of UNISPACE III reccomendations

- Mission of the University is the **development and dissemination of the knowledge** in particular towards the young generations.
- Since the foundations of University in Europe during the medieval age the **international dimension** of studies played a fundamental role
- La Sapienza University assumes that part of this mission is to promote the **removal of all the barriers** that are placed against this diffusion of the knowledge especially **in the countries that are eager to develop a space programme or to develop the space applications and services for the benefit of their populations.**
- This perspective fits with the **ASI institutional goals** of **knowledge development and tecnology transfer** in favour of **space countries**, especially the **emerging ones**.

The Kenyan reserchers

Anthony Joseph Kiroe

Master degree in Physics at Jomo Kenyatta University of Agriculture and Technology.

In 2009 obtained the Master in Satelliti e Piattaforme Orbitanti at the La Sapienza University of Rome with a research on “Development of the hiperube cubesat on board data handling subsystem”.

Assistant professor at the Jomo Kenyatta University.



Andrew Otieno Nyawade

Master degree in Elecytronic engineering at the University of Nairobi

In 2009 obtained the Master in Satelliti e Piattaforme Orbitanti at La Sapienza University of Rome with a research on

“Hyperspectral payload electrical ground support equipment “
Officer in Kenyan Air Force.



Robinson Ndegwa Gathoni

Master degree in Physics at the University of Nairobi

In 2009 obtained the Master in Satelliti e Piattaforme Orbitanti at La Sapienza University of Rome with a research on

“Hyperspectral payload electrical ground support equipment “
Researcher at the University of Nairobi.



Master in Satellites at Thales Alenia Space in Rome and at SAT EXPO 2009



The educational and training programme

- The Italian Space Agency (ASI) set up an educational programme based on three steps:
 - Welcoming and adaptation phase for the introduction of the Kenyan researchers in the cultural and social context
 - Participation to the 12 months Master Course in Satellites
 - Development of 6 months of further stages in an operative space environment
- University of Rome La Sapienza offered the participation to the Master programme after a formal interview to assess their minimum requirements (5 years academic degree in engineering or science needed)
- Italian Space companies (Telespazio and Selex Galileo) offered stage opportunities, along with the University of Rome La Sapienza

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Structure of the course:

One year full time (6 months of courses, 1 month of *team-work* e 5 months of stages)

25 hours of class per week, 5 per day, for a total of 350-400 hours

60 credits: 20 for the stage and the final report

17 moduli of 5 days

First semester since November to Mars

Team-work activity: pre-phase A study in a CDF environment CDF (*Concurrent Design Facility*)

Courses are evaluated by the students

Academic and industrial tutors during the stage



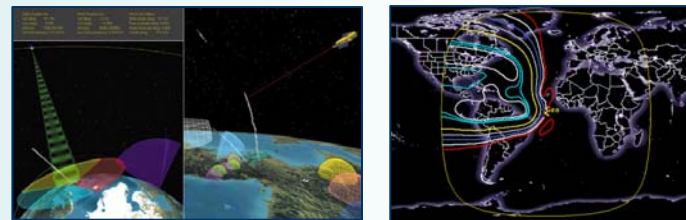
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Structure of the course:

3 Macro Modules

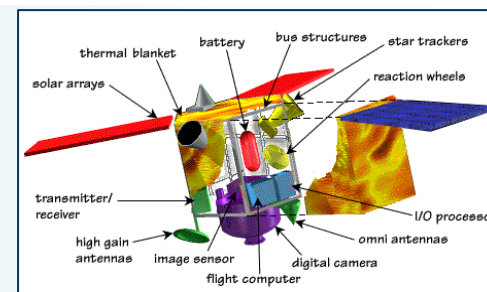
Space services and applications

7 modules sites: UniRoma, Telespazio, Thales Alenia Space Italia (TAS-I)

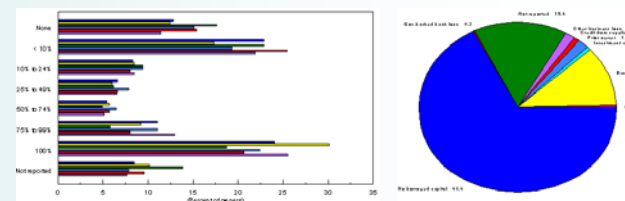


The satellite system

7 modules sites: UniRoma, Telespazio, Thales Alenia Space (TAS-I), ESA-ESRIN



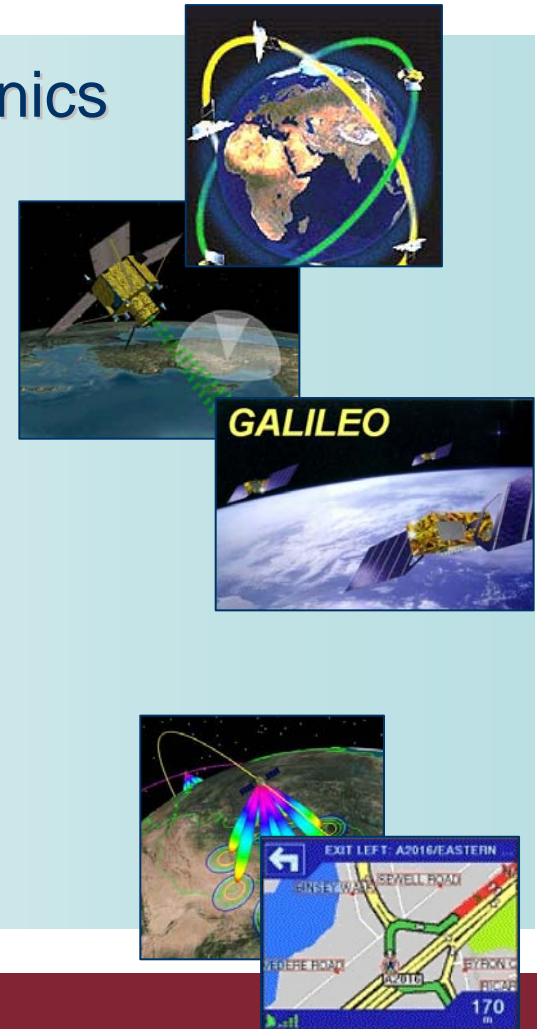
Space business and management Sites: BIC



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Macromodule 1 – Space systems and services

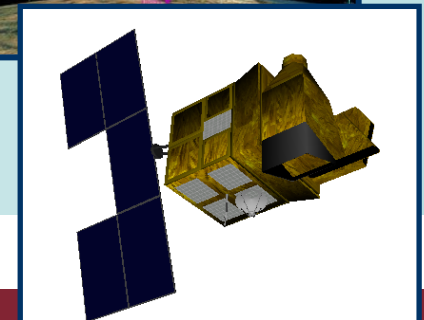
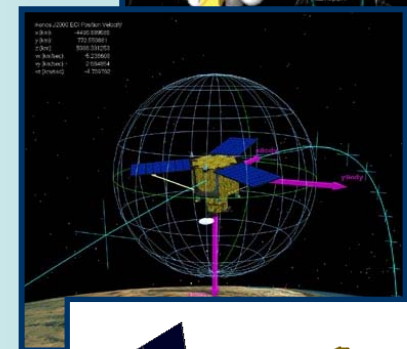
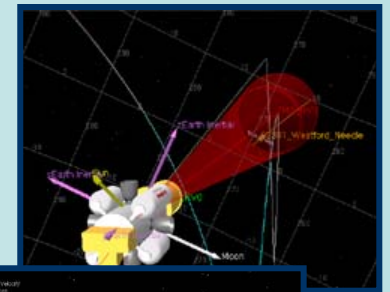
- Space environment and orbital mechanics
- Mission analysis and astrodynamics
- Science
- Telecom
- Remote Sensing
- Positioning and Navigation
- Applications and Services



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Macromodule 2 – The satellite system

- The satellite system: configuration and requirements
- Propulsion
- Attitude and orbital dynamics
- Structures, mechanisms and thermal control
- Power
- TT&C
- Ground segment
- Launch systems



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Macromodule 3 – Space business and management

- Program management, risk and cost analysis
- Space Business



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Classes



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The training programme

Mr. Robinson Ndegwa Gathoni
Satellite ground segment architecture
Hosting company: **Telespazio**

Mr. Andrew Otieno Nyawade
*Hyperspectral Payload Electrical Ground Support
Equipment*
Hosting company: **Selex Galileo**

Mr. Anthony Joseph Kiroe
*Development of the HyperCube Cubesat OnBoard Data
Handling Subsystem*
Hosting institution: **University La Sapienza**

Dr Anthony Kiroe having a speech at the 3rd IAA African Regional Conference



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The future in Space cooperation

- Continuing training for the next generation of researchers coming from Kenya.
- Establishing solid relationships and cooperation among La Sapienza University and Kenyan Universities.
- Developing research and Italian Kenian joint programmes and projects under the intergovernmental agreement.
- Extending the cooperation to other African countries and other emerging countries involved in space activities.