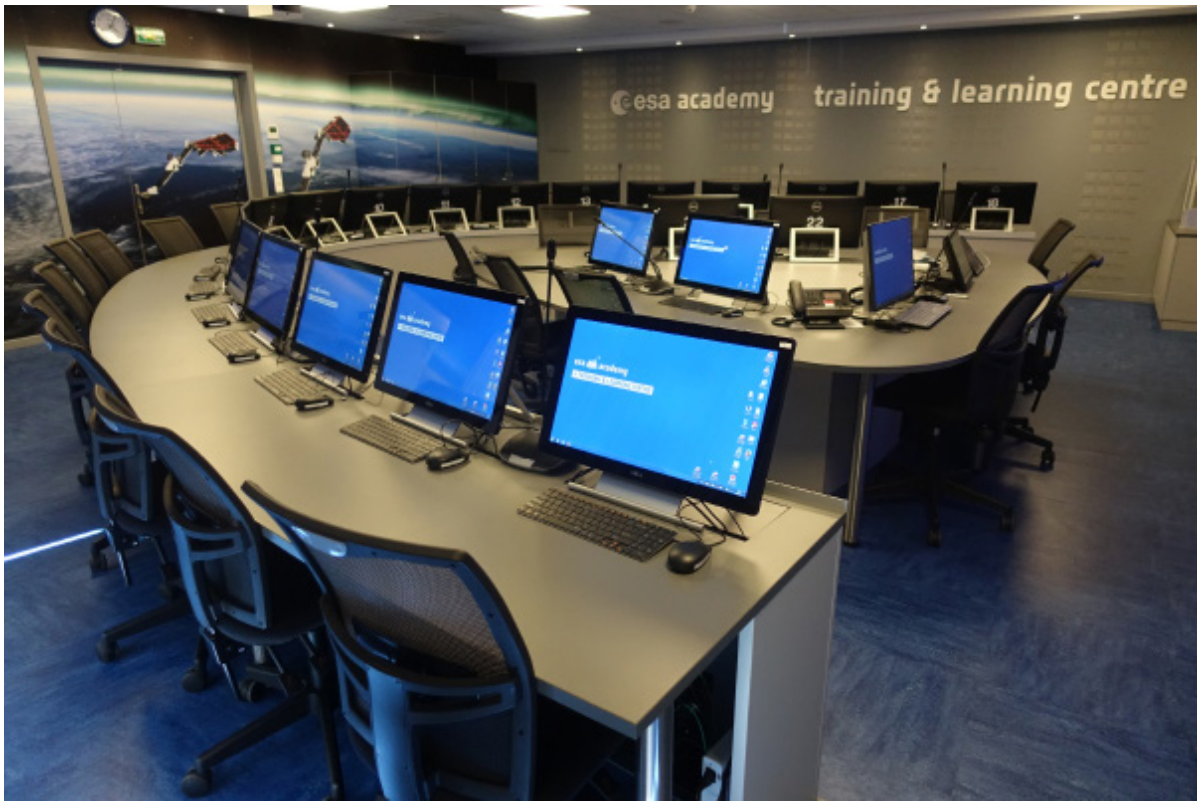
→ THE LADYBIRD GUIDE TO SPACECRAFT COMMUNICATIONS 2018

6 - 9 March 2018

Information booklet

ESA Education Office
ESA Academy's Training & Learning Centre
ESEC, Redu, Belgium



INTRODUCTION ESA EDUCATION OFFICE

Dear students,

Welcome to the European space, Security and Education Centre (ESEC) of the European Space Agency (ESA) and the Training and Learning Centre!

ESA's Education Office established two years ago the ESA Academy to enrich and complete the portfolio of opportunities offered to university students.

ESA Academy is composed of two elements: a suite of hands-on projects complemented by training sessions. As such, the ESA Academy is offering a transfer of space expertise, know-how and standard professional practice from ESA to European university students in close coordination with European academic institutions and, whenever possible, in partnership with European space industry and other organisations involved in space activities.

With the Training and Learning Centre, we want European university students, from Bachelor to PhD level, to get the opportunity through specific training sessions to complement their standard academic formation in space-related disciplines.

ESA and its Education Office are delighted to welcome you and hopefully offer you a unique experience during the Ladybird Guide to Spacecraft Communications Training Course 2018. You are the next generation of scientists and engineers and we want to stand by your side to help prepare your future.

Enjoy your training course!

Hugo Marée
Head of ESA Education Office

CONTENTS

SCHEDULE

Day	Morning		Afternoon	
Tuesday 06/03/2018	08:00-08:30 08:30-09:00 09:00-10:00 10:00-10:30 10:30-11:00 11:00-13:15 13:15-14:00	Bus from the Hotel Welcome & Introduction Course Introduction - Part 1 ESA & ESA Education Programme Coffee Break Course Introduction - Part 2 Lunch	14:00-16:00 16:00-16:30 16:30-18:30 18:30-19:00 19:30	The Challenge Coffee Break Modulation Bus to the Hotel Dinner
Wednesday 07/03/2018	08:00-08:30 08:30-10:30 10:30-11:00 11:00-12:00 12:00-13:15 13:15-14:00	Bus from the Hotel Demodulation Coffee Break Coding - Part 1 PROBA Operation Room Visit Lunch	14:00-16:00 16:00-16:30 16:30-17:30 17:30-18:30 18:30-19:00 19:30	Coding - Part 2 Coffee Break Coding - Part 3 Exercise - Part 1 Bus to the Hotel Dinner
Thursday 08/03/2018	08:00-08:30 08:30-10:30 10:30-11:00 11:00-12:00 12:00-13:15 13:15-14:00	Bus from the Hotel Protocols Coffee Break Transmission - Part 1 Baseband Equipment Visit Lunch	14:00-15:00 15:00-16:00 16:00-16:30 16:30-17:30 17:30-18:30 18:30-19:00 19:30	Transmission - Part 2 Reception - Part 1 Coffee Break Reception - Part 2 Exercise - Part 2 Bus to the Hotel Dinner
Friday 09/03/2018	08:00-08:30 08:30-09:30 09:30-10:30 10:30-11:00 11:00-12:00 12:00-13:15 13:15-14:00	Bus from the Hotel Real Ground Stations Summary Coffee Break Exercise - Part 3 Antenna, RF Visit & Galileo Lunch	14:00-16:45 16:45-17:15 17:15-17:45 19:00	Final Group Exercice & Coffee Break Conclusions Bus to the Hotel Dinner

Schedule is subject to change depending on lectures' progress.

CONTACT POINTS

In case of any problems/questions please contact ESA Education Office by email at esa.academy@esa.int

For urgent matters call:

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On site Emergency call:	3333 (works from every ESA phone)
Hotel Le Val de Poix:	+32 61 61 13 29

ESA EDUCATION OFFICE ORGANISERS

Hugo Marée
Head of Education Office
European Space Agency

Hugo Marée's professional career started in ESA's Redu tracking station as a spacecraft operations controller. He then became the director of the Euro Space Centre, an Edutainment facility on the thematic of space, before joining ESA's Headquaters in Paris where he became the Head of the Science Programme Communication Service. From Paris, he moved to the newly established Education Office at ESA/ESTEC where he first became the Head of the Policy and Coordination Unit. Since 2011 he is Head of the Education Office.

Piero Galeone
Head of Tertiary Education Unit, Education Office
European Space Agency

Piero Galeone has worked at ESA since 2002, first as Programme Manager for the ISS external payload SOLAR, which is still in operation today. In 2008 Piero moved to the Education Office and became Programme Manager for the European Student Earth Orbiter (ESEO) which will take pictures of Earth and measure radiation and plasma levels while in orbit. In 2012, Piero became Head of Tertiary Unit thus responsible for all university programmes of the ESA Education Office.

Natacha Callens
Administrator ESA Academy – Training and Learning Centre
Education Office
European Space Agency

Natacha Callens is a physicist and works for the ESA Education Office since 2009. After developing and coordinating for several years some ESA hands-on programmes, including the Fly, Drop and Spin Your Thesis! programmes, she is now in charge of the development and operation of the new ESA Academy's Training and Learning Centre.

Delphine Gorlé
Young Graduate Trainee for ESA Academy – Training and Learning Centre
Education Office
European Space Agency

Delphine Gorlé has recently graduated from the University of Liège with a Master of Engineering in Physics, after an Erasmus year at the Politecnico di Torino to study Nanotechnologies. She is taking part in the Young Graduate Trainee programme and works for ESA Education Office to support the Coordination of the ESA Academy's Training and Learning Programme.

Ariane Dédeban
Logistic and Administrative Assistant
Education Office
Redu Space Services for European Space Agency

Ariane Dédeban holds a Master's degree in Library Science from the University of Angers in France. She has worked in the field of secondary and tertiary education for the past 7 years. She joined Redu Space Services at ESEC in 2017. Her role is to coordinate the logistics and the administration of the ESA Education events at ESEC.

Merel Van Walleghem
Belgian National Trainee for ESA Academy's e-learning activities
Education Office
Belgian Science Policy Office/European Space Agency

Merel Van Walleghem is a biomedical scientist finishing a PhD thesis on space immunology at the Belgian Nuclear Research Centre (SCK•CEN) in collaboration with Ghent University. During her PhD research she was involved in the preparation and sample processing of human immunology and radiation sensitivity research projects on the International Space Station. As a Belgian National Trainee at ESA ESEC, she is supporting the development of ESA Academy's e-learning activities.

ESA TRAINER

David Evans
Mission Operations Concept Engineer
Advanced Operations Concepts Office of ESOC
European Space Agency

David started his career at the European Space Operations Centre (ESOC) in 1992 and worked as a flight control engineer and simulation officer on the EURECA, ERS-2 and CLUSTER-1 missions. In 1997 he joined EUTELSAT of Paris during a period of intense expansion involving 20 launches and 5 re-orbitings. He eventually became the satellite control centre manager before returning to ESOC in 2007. He now specialises in small spacecraft missions and advanced operations technology. He is the project manager for ESA's first nanosatellite mission OPS-SAT and the holder of several patents on housekeeping telemetry compression. He is also the author of the popular "Ladybird Guide to Spacecraft Operations" lecture courses.

GUEST SPEAKERS

Benoit Demelenne
Head of the Redu satellite operations
European Space Agency

Benoit Demelenne started to work at the ESA Redu Ground station in 1981.He became the first Missions Operations Engineer in 1983 for the first operational European Communications Satellite (ECS) launched in 1983. In 1995, he became responsible of the ARTEMIS data relay mission which has established a first world premiere in 2001 with the laser link communication between the Geo satellite ARTEMIS and the Leo satellite SPOT-4. Since 2006, he is appointed as the Head of the Redu satellite operations section responsible for the PROBA missions and the GALILEO hosting activities.

Etienne Tillmans
Mission Operations Engineer
European Space Agency

Etienne Tilmans has a MSc in Engineering and has joined ESA as spacecraft operations Engineer at the Redu centre for the first series of EUTELSAT GEO telecom satellites. Since 2000, he is in charge of the operations preparation and execution for the ESA mini satellites PROBA: Project for On Board Autonomy. His field of expertise is naturally about space & ground segment control and operations with a particular emphasis on operations automation.

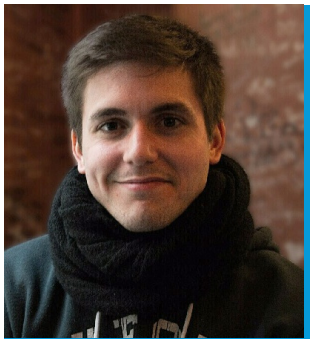
Christian Lezy
Galileo IOT StationEngineer
European Space Agency

Christian Lezy has an engineering degree in telecommunications. He started his career in Redu Ground Station in 1996, first in the software engineering team, he moved to the Payload In Orbit Test team 2 years later, validating and testing telecommunication payloads. In 2004 he became IOT Manager for ESA in Redu and started to share his expertise with Galileo project. Since 2011 he is fully dedicated to the Galileo project, preparing and leading the IOT Operations of every Galileo satellite after launch.

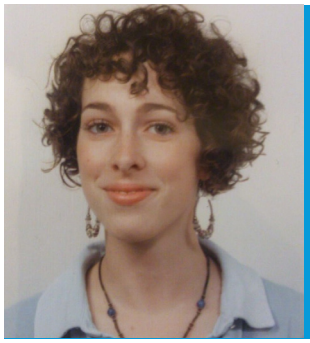
ESEC STUDENTS

Begz Altankhuyag
Field of study: Engineering
Level: Bachelor
University: Carleton University
Nationality: Canadian

Renée Andersen
Field of study: Earth and Space Physics and Engineering
Level: Bachelor
University: Technical University of Danemark
Nationality: Danish



Diego Bermúdez Martín
Field of study: Engineering
Level: Master
University: Polytechnic University of Madrid
Nationality: Spanish



Silvia Ceccato
Field of study: Engineering
Level: PhD
University: University of Padova
Nationality: Italian

Costel Cherciu
Field of study: Engineering
Level: Master
University: University Politehnica of Bucharest
Nationality: Romanian

Spyridon Daskalakis
Field of study: Engineering
Level: PhD
University: Heriot-Watt University
Nationality: Greek

Maeve Doyle
Field of study: Astrophysics
Level: Master
University: University College Dublin
Nationality: Irish

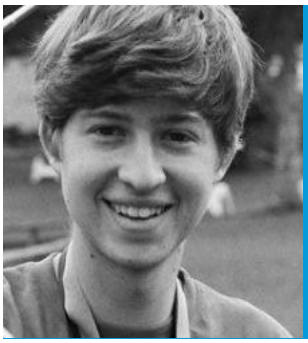
Francesco Formaggio
Field of study: Engineering
Level: PhD
University: University of Padova
Nationality: Italian

Dávid Kóbor
Field of study: Engineering
Level: Master
University: Budapest University of Technology and Economics
Nationality: Hungarian

Ariel Ladegaard
Field of study: Space Science and Robotics
Level: Bachelor
University: Aberystwyth University
Nationality: Norwegian

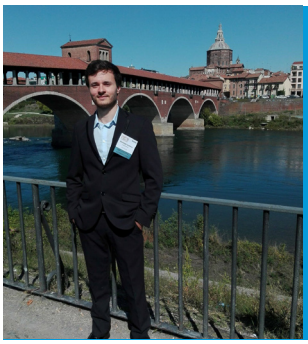
Naomi Luglio
Field of study: Engineering
Level: Master
University: Politecnico di Torino
Nationality: Italian

Joan Mitjans i Blasco
Field of study: Engineering
Level: Bachelor
University: Polytechnic University of Catalonia
Nationality: Spanish



Tom Mladenov
Field of study: Engineering
Level: Master
University: Universities of Hasselt and Leuven
Nationality: Belgian

Erik J. Sandal
Field of study: Computer Science
Level: Bachelor
University: University of Stavanger
Nationality: Norwegian



Giuseppe Siciliano
Field of study: Engineering
Level: PhD
University: University of Pavia
Nationality: Italian

Małgorzata Siutkowska
Field of study: Geodesy and Cartography
Level: Master
University: University of Warmia and Mazury
Nationality: Polish

Monica Stancu
Field of study: Geophysics
Level: Bachelor
University: University of Bucharest
Nationality: Romanian

Terese Svensson
Field of study: Engineering
Level: Master
University: Luleå University of Technology
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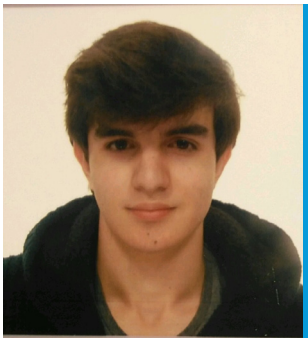

Daniel Vera Nieto
Field of study: Engineering
Level: Bachelor
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Field of study: Engineering
Level: Master
University: University of Manchester
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Andres Lüdeke
Field of study: Engineering
Level: Bachelor
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Nationality: German

Stefano Marinaci
Field of study: Engineering
Level: PhD
University: University of Salento
Nationality: Italian

LIVESTREAM STUDENTS

Boyan Naydenov
Field of study: Engineering
Level: Master
University: Polytechnic University of Catalonia
Nationality: Bulgarian

Ana Ambrosio
Field of study: Engineering
Level: Master
University: ISAE - SUPAERO
Nationality: Spanish

Matteo Marchetti
Field of study: Engineering
Level: Master
University: University of Pavia
Nationality: Italian

Laura Gonzalez Llamazares
Field of study: Engineering
Level: Master
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Guillermo Rodríguez Lage
Field of study: Engineering
Level: Master
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Michał Wieczorek
Field of study: Engineering
Level: Bachelor
University: Wrocław University of Science and Technology
Nationality: Polish

Thomas Golfetto
Field of study: Engineering
Level: Bachelor
University: University of Padova
Nationality: Italian

Gabriele Ceccato
Field of study: Engineering
Level: Master
University: University of Pavia
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Giorgio Pasquali
Field of study: Engineering
Level: Master
University: University of Pavia
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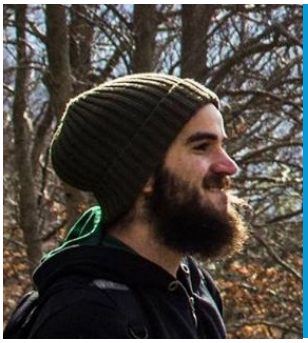
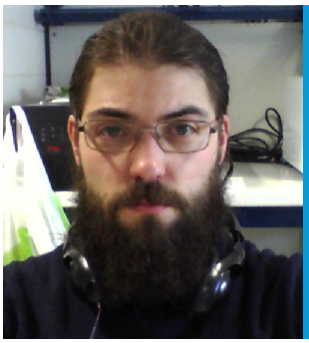
Nationality: Italian



Ioannis Varvaringos
Field of study: Engineering
Level: Bachelor
University: Aristotle University of Thessaloniki
Nationality: Greek

Pedro Cachim
Field of study: Engineering
Level: Master
University: Instituto Superior Técnico
Nationality: Portuguese

Federico Mustich
Field of study: Engineering
Level: Bachelor
University: University of Bologna
Nationality: Italian



João Silvestre
Field of study: Engineering
Level: Master
University: University of Lisboa
Nationality: Portuguese

GENERAL LECTURES

Welcome and Introduction

Natacha Callens

The Ladybird Guide to Spacecraft Communications Training Course 2018 is the twenty-fourth event of the ESA Academy's Training and Learning Programme and the second edition of the Training Course. This technical course, without excessive mathematics or technical jargon, is delivered by an ESA expert from the Advanced Operations Concepts Office of ESOC (European Space Operations Centre) in Darmstadt, Germany.

This four day course will mainly consist of formal lectures but with a heavy emphasis placed on the interaction with the students. Students will also work in teams on a group exercise over the week. The way communications systems are designed can have a crucial impact on how they are used and what problems can occur. The course will include a session on the physiological traps to be avoided when communicating with a spacecraft. Real stories of operational staff battling with wayward spacecraft – sometimes winning and sometimes losing – will be used wherever appropriate. Students will be presented with the data received from satellites at the time of a problem. They will have to work out "what went wrong?" and more importantly "what should they do now?". Students will also get to see spacecraft operations and communications through a visit of ESA-ESEC featuring antennae and operations rooms.

The European Space Agency: Space for Europe!

Natacha Callens

The European Space Agency is Europe's gateway to space. Its mission[1] is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. ESA is an international organisation with 22 Member States[2]. By coordinating the financial and intellectual resources of its members, it can undertake programmes[3] and activities far beyond the scope of any single European country. ESA closely works with space organisations outside Europe; employs about 2200 staff and owns dedicated facilities across Europe. ESA's job is to design the European space programme and to carry it through. ESA's programmes are designed to find out more about Earth, its immediate space environment, our Solar System and the Universe, as well as to develop satellite-based technologies and services (telecommunications, navigation), and to support European industries. The programme also includes space technologies R&D and transfer, the design of a family of launch vehicles and human spaceflight related activities, mainly through the participation to the International Space Station.

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1 As per its Convention: "to provide for, and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems".

2 Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom. Canada also sits on the Council and takes part in some projects under a Cooperation Agreement. Slovenia is an Associate Member. Other EU states also have Cooperation Agreements with ESA, such as Bulgaria, Cyprus, Lithuania and Malta. Latvia and Slovakia are participating in the Plan for European Cooperating States (PECS).

3 Mandatory and optional.

ESA Education Programme
Inspiring and Engaging the Next Generation of Space Engineers and Scientists

Natacha Callens

Education definitively plays a vital role in Europe's growth and development. If science, technology, engineering and mathematics education – the so-called STEM education – equips future citizens with the knowledge and skills which Europe needs in order to remain competitive, it first and foremost ensures a sufficient supply of science and engineering graduates; favours their employability and enables creativity, innovation and entrepreneurship.

The European Space Agency, in close partnership with the relevant stakeholders in the Member States is managing via the ESA Education Office:

- On one hand, a programme now known as the 'ESA Academy' which provides university-level students across Europe with complementary academic training and support, and with unique hands-on opportunities to gain, within a space working environment, significant practical experience during the full lifecycle of real and challenging space projects. As such, among many others, educational projects like 'Fly Your Thesis!' and 'Fly Your Satellite!' are exemplary evidences which show what can be achieved in support of Europe's need to inspire, engage and prepare students to undertake scientific and technical careers and to eventually better face the labour market.

- On the other hand, a programme which offers classroom resources and teachers training sessions thereby exposing younger Europeans to scientific and technical disciplines which are inherently interdisciplinary, cutting-edge and inspirational. Particularly, since 2006, in close collaboration with the national institutions in charge of formal education and managed by renowned experts and operators well integrated into the respective national education systems and networks, the European Space Education Resource Office project (ESERO) essentially offers training opportunities to thousands of primary/secondary teachers completed by the development, production, promotion and distribution of space-related classroom resources tailored to the national curricula. Thanks to the combination of the development of robust institutional partnerships on one hand, with on the other hand a decentralized and 'tailored to the needs' approach, ESERO has proven to be an efficient answer to the challenges faced in STEM education in the long term. ESERO offices are currently active in 14 ESA Member States.

As ESA's Director General recently stated: "ESA has been successful over the last 50 years because it has been able to recruit competent people. The successes for the next 50 years are dependent on our capacity, and that of the space industry, to recruit new motivated, talented and well prepared people. We have no other alternative than to motivate, educate and attract the next generation of space scientists and engineers".

THE LADYBIRD GUIDE TO SPACECRAFT COMMUNICATIONS - LECTURES

David Evans

Below you can find a detailed programme of the training course per lecture:

Introduction

Objectives:

- To appreciate the unique nature of being an operator
- To be able to describe the end to end mission design process
- To understand where operations fits in that process
- To understand the concept of spacecraft buses and payload

Programme:

1. Why is operating a spacecraft different than building one?
2. Common traps to watch out for
3. Do not be turkey
4. Standard spacecraft buses: Trucks and Trailers
5. The different subsystem functions

The Challenge

Objective:

- To appreciate the scale of the problems that must be overcome

Programme:

1. Introduction
2. What happens between the transmitter and the receiver
3. The characteristics of spacecraft transmitters and receivers
4. You are not alone (other transmitters & receivers)

Modulation

Objectives:

- To understand why information must be modulated onto high frequency waves
- To appreciate the choices available
- To understand the basic techniques and their advantages & disadvantages
- To appreciate the importance of baseband signal choice
- To describe real modulation systems

Programme:

1. Basics
2. Phase Shift Keying and modulation index
3. QPSK – a free lunch?
4. Fourier's brilliant insight
5. Why baseband signal shape is so important
6. Intermediate Frequency and Upconversion
7. Producing real BPSK and QPSK signals

Demodulation

Objectives:

- To appreciate the difference between the modulation and demodulation processes
- To appreciate the difficultly in recovering a baseband signal from the incoming wave
- To describe the different techniques and processes used to recover the baseband
- To introduce the concepts of signal, noise and error probabilities

Programme:

1. Demodulation is not quite the opposite of modulation
2. Recovering the baseband signal
3. Phase Locked Loops
4. Subcarriers
5. Costa's Loops
6. Signal to noise ratio and the probability of error
7. The importance of timing and bit sync

Coding

Objectives:

- To appreciate the need for coding
- To describe the different schemes and their advantages & disadvantages
- To appreciate that useful data rate is not the same as data rate

Programme:

1. Simple coding techniques and examples
2. Forward Error Correction (FEC)
3. Bandwidth considerations
4. Coding gain
5. Different coding schemes usually used on the downlink
6. Uplink coding schemes
7. Useful data rate – beware of different definitions

Protocols

Objectives:

- To appreciate the change from fixed frame protocols to variable length packets
- To describe the packet protocols and structures
- To understand the TC packet services and their advantages for operations
- To understand the fundamental idea behind PUS as well as its problems
- To appreciate the limitations of packets and how terrestrial protocols might be used

Programme:

1. TM Fixed length protocols
2. TM Packet protocols
3. Frame synchronsation
4. Pseudo randomiser
3. TM Frames
4. SLE
5. TC Fixed length protocols
6. TC Packet protocol, CLTUs, frames, segments and packets
7. TC Packet services: CLCWs, COP-1, routing and authentication
8. PUS
9. PUS gets messy
10. TCP and IP in space
11. Other protocols used in space

Transmission

Objectives:

- To understand the impact of frequency and antenna choice
- To quickly calculate important characteristics of your link with limited information
- To understand the difference between the real situation and the textbook calculation

Programme:

1. Antennas and Gain
2. Antennas, frequency choice and beamwidth
3. Why ERIP is a really useful number and how to calculate it
4. Power Flux Density and interference on the ground
5. The great free space path loss swindle
6. How to make a dirty link budget calculation in under a minute

Reception

Objectives:

- To appreciate the different criteria to be fulfilled before the link will close
- To understand the nature of noise
- To appreciate G/T as an extremely useful measurement

Programme:

1. Signal to noise at the receiver
2. What is noise and how do we calculate it?
3. Carrier Recovery
4. Data Recovery
5. G/T something we can measure at last
6. Other important aspects of ground stations

ESEC VISITS

Benoît Demelenne, Etienne Tilmans & Christian Lézy

ESA's ESEC in Belgium's Ardennes region is responsible for controlling and testing a range of satellites as part of ESA's ground station network. It is also home to the Space Weather Data Centre as part of ESA's Space Situational Awareness Preparatory Programme.

ESEc has been operational since 1 January 1968. It occupies an area of 29 000 sq m. Technical areas include control centres, technical equipment rooms and antenna bunkers. It is manned 24 by 24 and fully secured at all times.

ESEC provides S-band links for ESA's network of ground stations, as well as in-orbit testing (IOT) for telecommunication and navigation satellites. The main missions supported at Redu are the PROBA missions (PROBA-1, PROBA-2 & PROBA-V) and GALILEO.

A short guided tour of the satellite control centre dedicated to the PROBA satellites family will be given. These mini satellites are developed in the frame of technology demonstration mission but hosts also a main payload:

PROBA-1: high resolution hyperspectral LEO mission launched in 2001,
PROBA-2: UV sun watching LEO mission launched in 2009,
PROBA-V: worldwide vegetation monitoring LEO mission launched in 2013.

During the tour, the RF and data communication characteristics will be presented. A look will be given at the small S-band terminal and at the baseband equipment's bay. If time permits, a PROBA-V real time contact will be attended. Time for questions/answers will be foreseen.

Galileo is the European GNSS, an outcome of partnership between European Space Agency and European Commission. In its final configuration it will be composed of 30 satellites (18 launched as of today) and is compatible with the GPS system.From 2020 the systems will be fully operational, providing high-accuracy services around the clock and across the globe. The European system will be a civil system to the benefit of the citizens. A short presentation on Galileo and its payload in-orbit testing from ESEC will be given.

The site hosts more than 50 steerable antennas operating in a variety of frequency bands (S, Ku, Ka, L, C bands). The largest antennas are for Galileo In-Orbit-Testing L-band (20 m), Estrack S-band (15 m) and TMS-1M Ka-band (13.5m). The site also hosts 23 Ku-Band antennae for SES ASTRA and their satellite backup control centre. IOT facilities (antennas, measurement and processing chains) are also offered to industry for telecommunication satellites (Ku- & Ka-bands) testing.

The students will have the opportunity to have a guided visit of baseband equipment, as well as an antenna and RF visit.

ESEC

Address

ESEC
Place de l'ESA 1
6890 Redu

Lunch

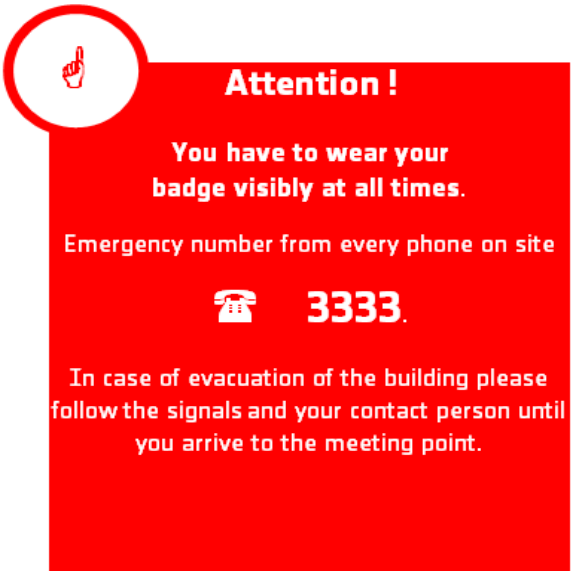
Lunch will be taken in the Redu Canteen from 13.15 to 14.00 everyday.

Coffee breaks

The ECS room (next to the ESEC canteen) will be always available for all participants to have a coffee break. To keep the disturbance for employees at the ESEC to a minimum, participants are asked to stay inside this room during free time and to not sojourn in the hallways of the building.

Visitor's badge

Upon first arrival at the ESEC, visitors will have to register at the gatehouse. For this, an ID-card or passport is required. Visitors will receive a visitor's badge which will provide access to the ESEC Admin building, the Training and Learning Centre room and the canteen building. The visitor's badges must be returned when leaving the centre at the end of each day.



General security and information

- Visitors must wear their visitor's badge visibly at all times
- Visitors must be accompanied at all times
- Smoking is prohibited inside of buildings
- The Centre is under video surveillance at all times
- Follow the instructions of your host or security personnel
- The use of cameras or any sort of audio or optical recording equipment is only permitted with prior authority from the Head of Centre

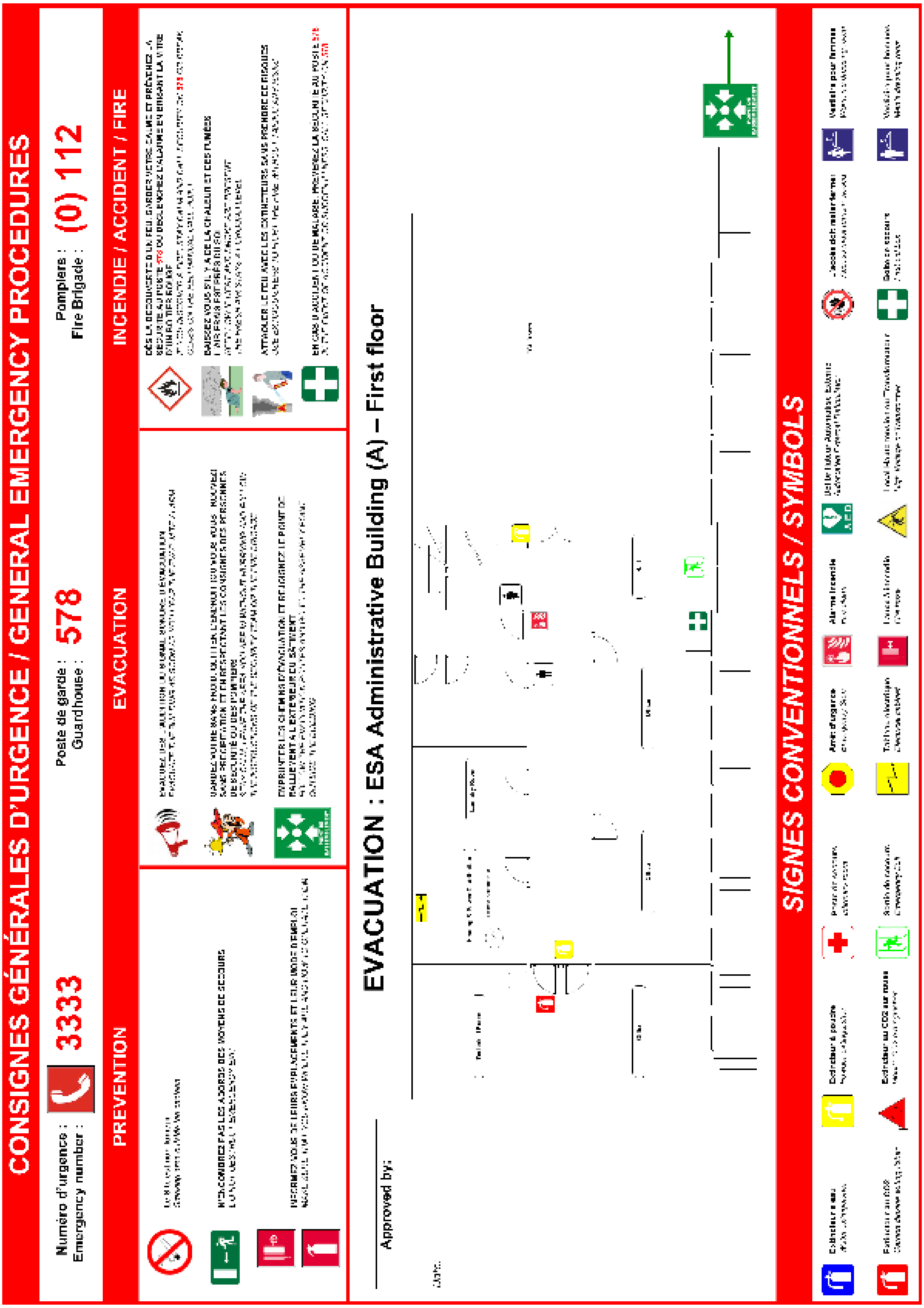
Evacuation

The signal to evacuate the premises is an audible and visible alarm from the smoke detectors all over the building. All persons on the premises must immediately stop work and head calmly, without running, for the nearest emergency exit.

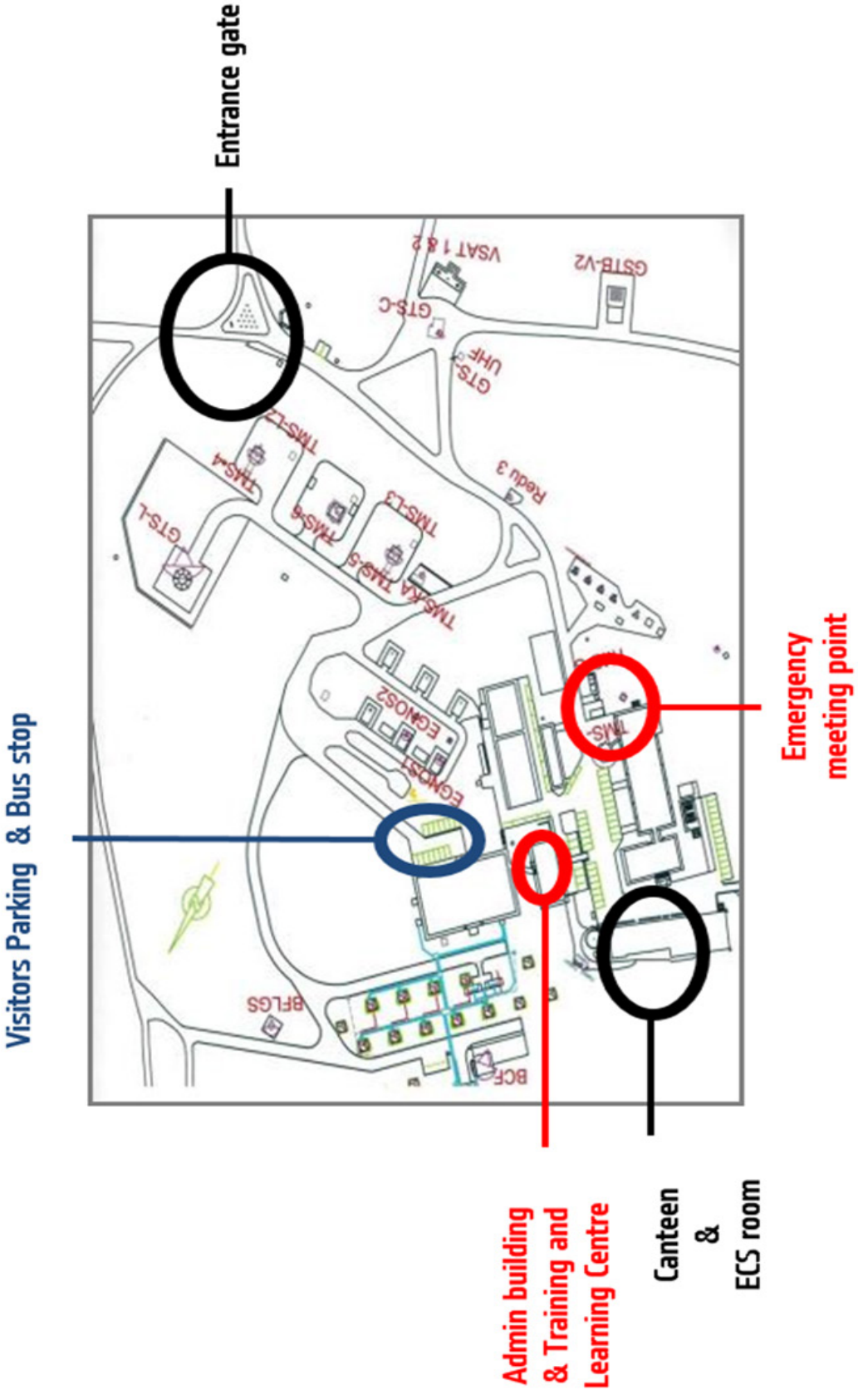
Smoking

Smoking damages the health of smokers and those around them.
ESA is a non-smoking organisation. Consequently, smoking inside the premises is strictly forbidden.
As a courtesy to others, smokers outside the building should keep their distance to prevent their smoke from spreading.

Map of ESEC Admin building



Map of ESEC


Entrance gate
Visitors Parking & Bus stop
Emergency meeting point
Admin building & Training and Learning Centre
Canteen & ECS room

HOTEL LE VAL DE POIX

Address

Hotel Le val de Poix
Rue des Ardennes 18
6870 Poix-Saint-Hubert
+32 61 61 13 29
www.levaldepoix.com

Map

Reception

The reception is open on weekdays, in the morning from 07:45 to 12:00 and in the afternoon from 16:00 to 20:00. At weekends, it is open from 08:30 to 20:00.

Check-in/check-out

Guests can check in from 16:00 and must check out before 11:00.

Restaurant/bar

The “Les Gamines” bistro-restaurant is open at the following times:

- Breakfast/buffet: 07:00 to 10:00 on weekdays and 08:00 to 10:00 at weekends.
- Dinner: 18:00 to 21:00 on weekdays and 18:00 to 21:30 at weekends.