MASTEAM
Welcome meeting
Spring 2019 intake

4th February 2019
Outline

- Institutional presentation
  - Your new university, campus, and school

- MASTEAM
  - Course structure, academic details, internships, etc

- Practical information
  - Legal aspects, information systems, etc

- Annex: summary of courses
YOUR UNIVERSITY

UNIVERSITAT POLITÈCNICA DE CATALUNYA (UPC) - BARCELONATECH
Facts & figures

- UPC, the Technical University of Catalonia
  - Founded in 1971, from century-old schools
  - 21 schools in 7 cities and 9 campuses

- Figures (course 2016/17)
  - 32000 students
    - of which 23000 bachelor students, 5300 at masters, and 2150 in PhD programs
    - 1400 incoming mobility students
  - 3000 teaching and research staff
  - 2000 administrative and service staff

- Well positioned in rankings (specifically in the ICT field) and presence in European research projects

http://www.upc.edu/en/the-upc/the-institution/facts-figures
Facts & figures – Rankings as of Feb 2019

**Academic Ranking of World Universities (ARWU) - Shangai**
- In the 236-265 rank in Europe and the 18-20 rank in Spain

**Times Higher Education (THE) WUR**
- In the 253-287 rank in Europe and the 10-11 rank in Spain

**QS World University Rankings**
- 120th in Europe and 7th in Spain

**Academic Ranking of World Universities (ARWU) Shangai**
- Engineering, Technology and Computer Science (2016)
- In the 76-100 rank globally and the 2nd rank in Spain

**Best Global University Rankings (US News)**
- Engineering
  - 13rd in Europe and 1st in Spain

**Best Global University Rankings (US News)**
- Computer Science
  - 6th in Europe and 1st in Spain
Facts & figures – Rankings as of Feb 2019

**Times Higher Education (THE) Young University Rankings**
- In the 61-88 rank in Europe and the 5-7 rank in Spain

**ShanghaiRanking’s Global Ranking of Academic Subjects**
- Instruments Science & Technology
  - 28th globally and 1st in Spain

**QS World University Rankings – Top 50 under 50**
- 8th in Europe and 2nd in Spain

**QS World University Rankings by Subject**
- Architecture and the Built Environment
  - 8th in Europe and 1st in Spain

**National Taiwan University Ranking by subject**
- Telecommunications, Electrical and Electronic Engineering
  - 47th globally and 1st in Spain

**QS World University Rankings by Subject**
- Civil and Structural Engineering
  - 8-9 rank in Europe and 1st in Spain

[https://www.upc.edu/rankings/en](https://www.upc.edu/rankings/en)
UPC Facts & figures

- 1st Spanish university in funding of EU Horizon 2020 research projects, and among the firsts across Europe

**5G Barcelona**

- Local and EU H2020 research project – MASTEAM groups involved
- i2Cat, UPC, CTTC, Atos, Telefonica, MWCapital, local & regional government, among other partners
- Presence of local partners in 22 out of 37 5G H2020 EU projects
5G Barcelona field trial

5G, THE NEW REVOLUTION

Beyond mobile data

- Continued user experience
  - 10GB/s
  - Faster connection

- Emergency services
  - - 1ms
  - Lower latency

- IoT Massive Deployment
  - 10TB/s
  - More connectivity

- Dynamic network management
  - +- Mbps
  - More flexibility
5G Barcelona field trial
MASTEAM

- “Master of Excellence” grants by FCLP
  - Best candidate receives 5000 euros grant

http://www.fundaciocatalunya-lapedrera.com/es/content/becas-m%C3%A1steres-de-excelencia
Two EETAC master students have received an Excellence Grant from Fundació Catalunya-La Pedrera

Albert Toro (MASTEAM) and Marta Granados (MAST) have been awarded by the Fundació Catalunya-La Pedrera in the eighth edition of the Scholarship Program for Masters of Excellence.

On October 17th, The Fundació Catalunya-La Pedrera celebrated the ceremony of the Excellence Grants program, in which Albert Toro (MASTEAM) and Marta Granados (MAST) received their grants in the eighth edition of the Scholarship Program for Masters of Excellence.

This initiative aims to recognize talent, promote excellence and impulse postgraduate quality. In this edition of the program have been awarded 52 scholarships in 51 programs among all the masters taught in Catalonia.

The awarded masters must fulfill several conditions, such as being taught by recognized professors with a research career, and being consolidated programs with a trajectory of excellence.
Faculty & Research

- World-class research in the areas of the master

Versions: (draft-toutain-lpwan-ipv6-static-context-hc)

00 01 02 03

Ipwan Working Group
Internet-Draft
Intended status: Informational
Expires: September 3, 2017

A. Minaburo
Acklio
L. Toutain
IMT-Atlantique
C. Gomez
Universitat Politecnica de Catalunya
March 02, 2017

LPWAN Static Context Header Compression (SCHC) and fragmentation for IPv6 and UDP
draft-ietf-lpwan-ipv6-static-context-hc-01

Abstract

This document describes a header compression scheme and fragmentation functionality for IPv6/UDP protocols. These techniques are especially tailored for LPWAN (Low Power Wide Area Network) networks and could be extended to other protocol stacks.
Faculty & Research

- World-class research in the areas of the master

UPC patents

The Universitat Politècnica de Catalunya (UPC) has been awarded a patent for a device that can provide a cardiovascular diagnosis with a single, non-invasive test. The device uses sensors in contact with the heart (electrocardiography) and is intended for use in both the United States and China, with sales expected to start next week at the MWC in Barcelona.

Cardiovascular disease is the leading cause of death worldwide, and the use of electrocardiography can help detect abnormalities. The UPC device translates the heart's electrical activity into a test that can be performed in a single test and can be used for cardiovascular patients and patients at risk.

Now, researchers from the UPC have developed a new electrocardiographic device that can be used for those who are not able to access traditional electrocardiography equipment. The device uses sensors that can be placed on the skin and can provide real-time coverage.

7/02/2017
Alumni

- LinkedIn: 170+ contacts
Alumni

- LinkedIn: 170+ contacts
YOUR CAMPUS

CAMPUS DEL BAIX LLOBREGAT (CBL)
PARC MEDITERRANI DE LA TECNOLOGIA (PMT)
A Campus (CBL) embedded in a Technological Park (PMT)
The PMT

What is the PMT?

- The PMT is a nerve centre for research and innovation that aims to foster relations between:
  - University engineering schools (CBL - Campus del Baix Llobregat of the UPC, and UOC – Open University)
  - Public research centres
  - Private companies involved in technological innovation
  - Technology-based spin-off companies

Topic Areas

- Information and Communication Technologies
- Aeronautics and Space Engineering
- Biological Engineering
- Agri-Food Engineering and Biotechnology
- Photonic Technologies
- Geo-Information and Remote Sensing
- Environmental Technologies
- Numerical Methods in Engineering

Website: http://www.pmt.es/front-page/not_available_lang?set_language=en&cl=en
Video: https://www.youtube.com/watch?v=tXwZwET0tlo
European Space Agency - Business Incubator (BIC)
Institute of Photonic Sciences

ICFO
Institut de Ciències Fotòniques

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola d’Enginyeria de Telecomunicació
i Aeroespacial de Castelldefels
Telecommunications Technology
Centre of Catalonia
School of Agricultural Engineering of Barcelona - UPC
Universitat Oberta de Catalunya (UOC, Open University)
International Center for Numerical Methods in Engineering (UPC, building shared with EETAC)
i2cat® Foundation (Internet 2 Catalonia)
Companies established at the PMT

- 4M Iberoamérica
- SATCONXION
- bound4blue
- OBJECTIU COMUNICACIÓ
- Technology Assistance BCNA 2010, S. L. (TAB)
- MAR TRADUCCIONES
- MakeMailing
- REVERTIS
- Ecococon
- BCN3D Technologies
- Signadyne
- Hemav
- Isigma
- alterAid
- DAPCOM
- Cosingo - Imagine Optic Spain
- Almodis Solutions
- FOOD & MUSIC
- Thrombotargets Europe
- Rokubun
- FROM BCN
-geo numérique
- IRIS
- rr-consult
Campus Library

Some figures:
- Covered area: around 3000 m², on 3 floors
- Seats: 300
- Computers: 77
- Laptops: 40
- Collections:
  - 16000 volumes at the room,
  - 1400 magazines,
  - 6000 volumes on warehouse
  - 20000 volumes in process of catalogue
- Global WiFi coverage
- Self-service printer machines
Residence

Pius Font i Quer Accommodations in Castelldefels – Opened in September 2011.

- 187 rooms which include **single** studios, each with bathroom and kitchen, and **apartments** for two people, with a living-dining room, kitchen and bathroom, all fully equipped for habitation.
- Designed to accommodate **university students, grant holders, researchers, guest lecturers** and other users visiting the **CBL and PMT**, as well as general members looking for **accommodation in Castelldefels**.

http://www.resa.es
Canteen

- 7:30 AM – 8 PM during the course
- Breakfast, lunch
- Study room (open after hours and exam weekends)
YOUR SCHOOL

CASTELLDEFELS SCHOOL OF TELECOMMUNICATIONS AND AEROSPACE ENGINEERING (EETAC)
EETAC

- Founded in 1991 as EUPBL in Sant Just Desvern
  - Bachelor in Telecommunications Systems Engineering
  - Bachelor in Networks Engineering (Telematics)
- 2001 – Changes its name to EPSC
  - Becomes a graduate school and starts the master program in telecommunications
  - Moves to Castelldefels Campus
- 2002 – Bachelor in Aeronavigation Engineering
- 2006 – MASTEAM (2 years)
- 2007 – MAST – Master in Aerospace Engineering
- 2009 – Adaptation to the Bologna process (4 year BSc programs)
- 2010 – Changes its name to EETAC
- 2015 – MASTEAM (1 year)
C4 building: classrooms, labs, teacher offices, research
C3 building: teacher offices, research labs + CIMNE
## Academic Programs

<table>
<thead>
<tr>
<th>Bachelor degrees (4 years)</th>
<th>Bachelor’s degree in Telecommunication Systems Engineering</th>
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<tbody>
<tr>
<td></td>
<td>Bachelor’s degree in Network Engineering</td>
</tr>
<tr>
<td></td>
<td>Bachelor’s degree in Aerospace Engineering</td>
</tr>
<tr>
<td></td>
<td>(specialization in Air Navigation and Airports)</td>
</tr>
<tr>
<td></td>
<td>Double degrees (Telecom+Network, Aerospace+Telecom, or Aerospace+Network) in 5.5 years</td>
</tr>
</tbody>
</table>
# Academic Programs

<table>
<thead>
<tr>
<th>Master degrees</th>
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</thead>
<tbody>
<tr>
<td>Master of Science in Telecommunication Engineering &amp; Management (MASTEAM) – 1 year</td>
<td></td>
</tr>
<tr>
<td>Master in Aerospace Science And Technology (MAST) – 1.5 years</td>
<td></td>
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<tr>
<td>Master in Air Navigation and Airports (Air Traffic Controller habilitation – temporarily discontinued)</td>
<td></td>
</tr>
<tr>
<td>Master in Unmanned Aircraft (Drones) Systems Engineering, MUASED – 1 year</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Doctoral courses</th>
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</thead>
<tbody>
<tr>
<td>EETAC professors collaborate, among others, in the following PhD programs at UPC:</td>
<td></td>
</tr>
<tr>
<td>• Electronic Engineering</td>
<td></td>
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<tr>
<td>• Network Engineering (Telematics)</td>
<td></td>
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<tr>
<td>• Signal Theory and Communications</td>
<td></td>
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<tr>
<td>• Computer Science</td>
<td></td>
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<tr>
<td>• Management and Business Organization</td>
<td></td>
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<tr>
<td>• Aerospace Science and Technology</td>
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</tbody>
</table>
## University Departments and Faculty

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>DEPARTMENT</th>
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<tbody>
<tr>
<td>Computer Architecture</td>
<td>20</td>
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<tr>
<td>Electronics Engineering</td>
<td>12</td>
</tr>
<tr>
<td>Network Engineering (Telematics)</td>
<td>20</td>
</tr>
<tr>
<td>Management and Business Organization</td>
<td>15</td>
</tr>
<tr>
<td>Signal Theory and Communications</td>
<td>35</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>1</td>
</tr>
<tr>
<td>Applied Physics and Aeronautics Engineering</td>
<td>34</td>
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<tr>
<td>Materials and Structure Engineering</td>
<td>2</td>
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<tr>
<td>Geotechnical Engineering and Geo-Sciences</td>
<td>4</td>
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<tr>
<td>Applied Mathematics I</td>
<td>1</td>
</tr>
<tr>
<td>Applied Mathematics III</td>
<td>1</td>
</tr>
<tr>
<td>Applied Mathematics IV</td>
<td>15</td>
</tr>
<tr>
<td>Graphical Expression in Engineering</td>
<td>11</td>
</tr>
<tr>
<td>Agri-Food Engineering and Biotechnology</td>
<td>2</td>
</tr>
<tr>
<td>Control theory and industrial computers</td>
<td>1</td>
</tr>
<tr>
<td>Physics and Nuclear Engineering</td>
<td>1</td>
</tr>
<tr>
<td>Institute of Energy Technology</td>
<td>2</td>
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<tr>
<td>Applied Mathematics</td>
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<tr>
<td>TOTAL</td>
<td>165</td>
</tr>
</tbody>
</table>
EETAC Research Groups

- Advanced Materials and Technologies for Communications
- Audio-visual Systems
- Broadband Networks and Services
- Control, Monitoring and Communications
- Distributed Systems Architectures
- Instrumentation, Sensors and Interfaces
- Intelligent Communications and Avionics for Robust Unmanned aerial Systems
- Mobile and Radio Communications
- Optical Communications
- Wireless Networks
- Astronomy and Astrophysics
- Combinatorial & Graph Theory and Applications
- Materials group
- Microgravity and Modelization group
- Non Linear Dynamic of Fluids group
MASTEAM
MASTER IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT
Scope and Objectives

- Telecommunication has evolved from audio and video communication for personal information exchange and entertainment to pervasive data communication in the Mobility and Internet-of-Things era.

- This master degree is intended for those willing to acquire the skills that will enable them to conceive, design and implement cutting-edge engineering solutions based on the latest telecommunication and Internet technologies in order to improve people’s welfare in a sustainable economy.
Scope and Objectives – 5G

5G Scenario

(Source: ETRI graphic, from ITU-R IMT 2020 requirements)
Scope and Objectives – Internet of Things

Optical networks, IP protocols, SDN

Data centers, networks, protocols, SDN, NFV, Big Data

Radiocomms, protocols, SDR

Electronics, low-power

IoT gateway

Sensors
Approach/Strategy

- Courses cover a broad spectrum of topics including sensors to obtain data, wireless and optical technologies for data communication, advanced data-processing methods, algorithms for design optimization and the strategies to translate ideas into new devices and services.

- Yet other courses delve into cutting-edge applications such as the Internet of Things, smart objects, Body Area Networks, specialised tools such as image processing, or security, and aspects such as management and service engineering.

- Finally, students will consolidate their knowledge by applying it to a challenging problem during the master thesis.

- Teaching resources largely involve student participation in lectures, laboratory work and hands-on projects.
Structure of the master program

- **Workload**: 60 ECTS credits = 1500h
  
  [https://es.wikipedia.org/wiki/European_Credit_Transfer_and_Accumulation_System](https://es.wikipedia.org/wiki/European_Credit_Transfer_and_Accumulation_System)
  
  - At UPC masters, 1 ECTS = 25h of student activities = 9h at classroom + 16h of autonomous learning

- **Mandatory contents**: 15 ECTS
  
  - 1A1 courses

- **Optional contents**: 33 ECTS
  
  - 1A2, 1B1, 1B2
  
  - Total optional offer: 42 ECTS

- **Master Thesis**: 12 ECTS
Semester 1A (14 weeks)

- Optimization for Applied Engineering Design (3)
- Network Engineering (3)
- Next Generation Wireless Communications and IoT (3)
- Sensors and Interfaces (3)
- ICT-based Entrepreneurship (3)

Semester 1A (7 weeks)

- Optical Networks for Cloud-Based Services (3)
- IoT & Ubiquitous IP (3)
- 5G Mobile Network Planning (3)
- Applied Image Processing (3)
- Body Sensor Nodes (3)
- Augmented Reality & Smart Objects (3)

Semester 1B (14 weeks)

- Network Security Authentication & Authorization (3)
- Low-power Systems with Energy Harvesting (3)
- Software Defined Radio (3)
- Big Data & Data Mining (6)
- Master Thesis (12)

Semester 1B (7 weeks)

- Service Engineering (3)
- Creativity & Engineering (3)
- Project on ICT-based Business Models (3)

In parenthesis, the number of ECTS credits

Mandatory course

Optional course

Recommended

Pre-requisite
Calendar and Course Schedule

- Published in both the current website and Atenea’s MASTEAM course
  - Organized in 13 or 14 weeks – check the calendar
  - Holidays
  - Adjustments such as “Thursday Sept 27th becomes a Monday”

- Exam weeks, mid-semester and end of semester – check the exam calendars

- Lectures will take place mainly in classroom C4-021B
  - Ground floor, blue tower, in the middle of the C4 building
  - Laboratories: 334-5G, 331G (yellow tower), 127B and 129B (blue tower), among others

- Weekly talks / meetings on Wednesdays 17:30h
  - Research talks, companies, academic meetings
  - Attendance is mandatory – they are part of the program
# Academic Calendar (Spring 2019)

<table>
<thead>
<tr>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
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<td><strong>MO</strong></td>
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<td>week8</td>
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<tr>
<td>week9</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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**Legend:**
- **Yellow:** School day
- **Green:** Marks publication deadline (12h)
- **Blue:** Deadline for revision of marks (12h)
- **Red:** September 27th - Monday schedule
- **Gray:** Laboratory exams
- **Light Gray:** Non school day
- **Light Green:** Exams
- **Dark Gray:** PAU
- **Dark Green:** Lab exams / PAU
- **Orange:** Holiday
Course schedules (Spring 2019)

OPTIM Optimization for Applied Engineering Design
NETENG Network Engineering
WICOM Next Generation Wireless Communications and IoT
SENSORS Sensors and Interfaces
ENTREP ICT-based Entrepreneurship

1A1 courses - Weeks 1 to 6 + exams in March/April

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
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<td>09:30-10:00</td>
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<td>10:00-10:30</td>
<td>SENSORS 021B</td>
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<td>10:30-11:00</td>
<td>SENSORS 021B</td>
<td>11:00-11:30</td>
<td>SENSORS 021B</td>
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<tr>
<td>11:00-11:30</td>
<td>WICOM 021B</td>
<td>11:30-12:00</td>
<td>WICOM 021B</td>
<td>WICOM 021B</td>
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<tr>
<td>11:30-12:00</td>
<td>NETENG 021B</td>
<td>12:00-12:30</td>
<td>NETENG 021B</td>
<td>ENTREP 021B</td>
</tr>
<tr>
<td>12:00-12:30</td>
<td>WICOM 021B</td>
<td>12:30-13:00</td>
<td>ENTREP 021B</td>
<td>SENSORS 021B</td>
</tr>
<tr>
<td>12:30-13:00</td>
<td>WICOM 021B (Only week 4)</td>
<td>13:00-13:30</td>
<td>SENSORS 021B (Only week 4)</td>
<td>WICOM 021B</td>
</tr>
<tr>
<td>13:00-13:30</td>
<td>Talks/meetings</td>
<td>13:30-14:00</td>
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<td>13:30-14:00</td>
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</table>
## 1A2 courses - Weeks 7 to 13 + exams in June

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
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<td>10:30-11:00</td>
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<tr>
<td>11:00-11:30</td>
<td>OPTICAL 021B</td>
<td>ARASM 021B</td>
<td>OPTICAL 021B</td>
<td>IOT-IP 021B</td>
</tr>
<tr>
<td>11:30-12:00</td>
<td>5GPLAN 021B / 127B</td>
<td>IMAGE 021B / 127B</td>
<td>(8:30 to 11:00 on weeks 7, 9 and 11, 9:00 to 11:00 on weeks 8, 10, and 12)</td>
<td>5GPLAN 021B</td>
</tr>
<tr>
<td>12:00-12:30</td>
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<tr>
<td>12:30-13:00</td>
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</tr>
<tr>
<td>13:00-13:30</td>
<td>Talks/meetings</td>
<td>BODYSSENS 021B / 230B</td>
<td>IMAGE 021B</td>
<td></td>
</tr>
<tr>
<td>13:30-14:00</td>
<td></td>
<td>(11:00 to 13:30 on weeks 7 and 10, 11:00 to 13:00 on weeks 8, 11, 12 &amp; 13)</td>
<td>(11:00 to 13:00 on weeks 8 and 10, 11:00 to 13:30 on weeks 7, 9, 11, and 12)</td>
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</tbody>
</table>

- **IOT-IP**: Internet of Things and Ubiquitous IP
- **5GPLAN**: 5G Mobile Network Planning
- **IMAGE**: Applied Image Processing
- **OPTICAL**: Next-Generation Optical Network Infrastructures for Future Cloud-Based Services
- **ARASM**: Augmented Reality & Smart Objects
- **BODYSSENS**: Body Sensor Nodes
NETAUTH  Network Security - Authentication and Authorization
BIGDATA  Big Data and Data Mining
SDR     Software-Defined Radio
LOWPOW  Low-power Systems with Energy Harvesting

1B1 courses - Weeks 1 to 6 + exams in March/April

<table>
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<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
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<th>THURSDAY</th>
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<td>17:00-17:30</td>
<td>BIGDATA 021B</td>
<td>NETAUTH 021B</td>
<td>SDR 021B</td>
<td>SDR 021B / 330B</td>
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<tr>
<td>17:30-18:00</td>
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<td>Talks/meetings</td>
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<tr>
<td>18:00-18:30</td>
<td>NETAUTH 021B</td>
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<td>LOWPOW 021B / 230B</td>
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1B2 courses - Weeks 7 to 13 + exams in June

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BUSINESS Project on ICT-based business models
SERVICE Service Engineering
CREA Creativity and Engineering
BIGDATA Big Data and Data Mining
Enrolment & Qualification

- Enrolment takes place on February and September
  - First enrolment (today!) is face-to-face, presentational, but the next ones can be done remotely via e-secretaria.

- You must enrol the 1x1 and 1x2 (where x = A or B) subjects – one enrolment per semester

- Marks are numerical, scale 0-10
  - You need at least a 5 to pass the course
  - In case you obtain a 9 or more, you can be eligible for “with honors” distinction (“Matrícula d’Honor”, MH).
    - Limited to the best 5% students in each course
    - But it is up to the professors to decide if any student deserves it
    - Discount in the next enrolment
Academic Performance

- If you do not pass 15 credits in your first year (2 semesters), you cannot continue your studies
  - You can request a one-time exception to the rule – but must be justified

- Alpha factor = credits passed / credits enrolled
  - If alpha < 0.5, your next enrolment will be limited to 24 credits
  - If alpha < 0.3 for 3 times, you cannot continue your studies
    - You can request a one-time exception to the rule – but must be justified
Weekly talks, seminars, visits
Weekly talks, seminars, visits

BSC-CNS supercomputer
MASTEAM talks - Building Quantum Technologies - Carlos Abellán

Wednesday 9 November, 17:30h, C4-001 (Sala de Actos / Main Hall), Campus Castelldefels UPC.

The Master's degree in Applied Telecommunications and Engineering Management (MASTEAM) organizes a weekly series of activities (talks, technical visits, discussion pannels) that complement the academic activities with real-world experiences from companies, research centres and institutions in the main topics of the master: Internet of Things, Smart Cities, 5G mobile communications, Software-Defined Networking (SDN) and Radio (SDR), cloud computing, among others.

This week's activity will be a talk from Mr Carlos Abellán (ICFO, Institute of Photonic Sciences).

Title: Building Quantum Technologies

Abstract: In this talk we will review the state of quantum technologies at the industry level as well as current challenges and efforts towards creating scalable products. Following a pragmatic and intuitive approach, we will also discuss about those quantum effects that motivates the development of technologies. Finally, I will present a new worldwide scientific collaboration that will perform, on November 30th, several fundamental quantum physics experiments using the contribution of thousands of people like us.

Bio: BSc in Telecom engineering and MSc in Photonics Science. Experienced on bringing state-of-the-art technology from concept to customer validation. PhD student at ICFO, the Institute of Photonic Sciences, and trained at the Haas School of Business (UC Berkeley).

LinkedIn: https://www.linkedin.com/in/carlosabellan
Twitter: @cabellan
Master Thesis

- Research / development work, to be defended.
  - Advised / directed by an EETAC teaching staff member
  - Written report + public presentation, evaluation committee
  - Outcome: research paper (journal, conference) + divulgative poster/blog entry

- Can be done at:
  - EETAC research groups
  - Research institutes (only those with a UPC agreement)
  - Companies (only those with a UPC agreement)

  External theses require an academic tutor-supervisor from EETAC

- Thesis proposals are published in the EETAC website
  [https://mitra.upc.es/SIA/PFC_PUBLICA.LLISTAT_OFERTS?w_codi_programa=1142](https://mitra.upc.es/SIA/PFC_PUBLICA.LLISTAT_OFERTS?w_codi_programa=1142)

- Collection of MASTEAM theses from previous years
  [https://upcommons.upc.edu/handle/2117/89303?locale-attribute=en](https://upcommons.upc.edu/handle/2117/89303?locale-attribute=en)
Internships

- You can do internships at companies (provided they have an agreement with EETAC), but you cannot obtain MASTREAM credits
- Maximum of 600h during the whole program
- When?
  - After having passed at least 15 ECTS credits
  - My advice: wait until the second semester or after 30 ECTS
- Your academic tutor must review and approve the work plan, considering your workload and academic records
- If you are older than 28 years, the School insurance does not cover the internship, and you should contract one. UPC has an agreement with CONFIDE
- More info: https://eetac.upc.edu/ca/els-estudis/practiques-academiques-externes
Mobility and Double Degrees

- Master Thesis in more than 30 partner institutions in Europe
  
  [url: https://eetac.upc.edu/ca/fitxers/mobility-opportunities-masteam.pdf]

- Double Degree agreements
  - 1 year MASTEAM + 1 year abroad = 2 master degrees
  - **Master in Telecommunications Engineering**, Università dell'Aquila (UNIVAQ), Italy. More details [here](#).
  - **Cranfield University (UK):**

- Negotiations ongoing with IST Lisbon and Karlstad University
Access to PhD programs

- To be admitted in a PhD program in the European Higher Education Area (EHEA), you must have:
  - An official Bachelor Degree and at least an official Master Degree
  - At least 300 ECTS credits between Bachelor and Master

- MASTEAM is an official Master degree recognized by Spanish and European authorities.

- Therefore, combined with a 240 ECTS Bachelor Degree (equivalent to 4 years full-time), it allows you to access an official PhD program
  - Foreign students must legalize/convalidate their Bachelor Degrees in the Spanish Ministry of Education
Industrial Doctorates Plan of the Government of Catalonia in which the UPC participates

List of authorized thesis for reading

DOCTORAL DEGREE IN BUSINESS ADMINISTRATION AND MANAGEMENT
2016/2017 Academic Year

Doctoral programmes by subject area

- ARCHITECTURE, URBANISM AND CONSTRUCTION
  - ARTIFICIAL INTELLIGENCE
  - COMPUTER ARCHITECTURE
  - COMPUTING
  - ELECTRONIC ENGINEERING
  - ERASMUS MUNDUS IN DISTRIBUTED COMPUTING
  - ERASMUS MUNDUS IN INFORMATION TECHNOLOGIES FOR BUSINESS INTELLIGENCE (IT4BI – DC)
  - ERASMUS MUNDUS IN INTERACTIVE AND COGNITIVE ENVIRONMENTS
  - NETWORK ENGINEERING
  - SIGNAL THEORY AND COMMUNICATIONS

- CIVIL ENGINEERING

- INDUSTRIAL ENGINEERING

- INFORMATION AND COMMUNICATIONS TECHNOLOGIES ENGINEERING

- SCIENCES
Ethics & Competences

As a UPC master student, we expect you to

- Have a strong sense of ethics: cheating, copying & pasting, etc are not an option neither here nor in the professional world

- Work hard: a master student must demonstrate ability to produce good results and excel – be self-demanding!

- Demonstrate research-oriented and management skills

- Acquire and demonstrate competences
  - Cooperative work – working in teams
  - Autonomous learning – not everything will be provided
  - Critical thinking and self-evaluation of your work
  - Good oral and written skills
  - Communication – both with instructors and fellow students

- Our mission is to help you discover how far you can go
PRACTICAL INFORMATION
Foreign (non-EU) students

- NIE / TIE card
  - Foreign visitor’s ID card
  - You MUST obtain your NIE / TIE as soon as possible
  - Visit
    - External relationships office at Castelldefels Campus
    - International and Corporate relations Bureau at Campus Nord Barcelona
      https://www.upc.edu/sri/en/students/international-students

- Legalisation of Academic documents
  - Spanish Ministry of Education
  - Must be started as soon as possible, in order to have it finished by the end of your studies, and must include the average qualification
  - Visit the Teaching Office cbl.oficina.docencia@upc.edu
Transport tips

- The Campus can be reached by
  - Train - fastest option from Barcelona
    - All R2sud and R2 lines stop at Castelldefels – do NOT take regional trains (R13, R15, R16)
    - 6 trains/h from/to Barcelona at peak hours, 4 otherwise
    - 20-25 mins from/to Sants-Estació (central station), 25-30 mins from/to Passeig de Gràcia, 35-40 mins from/to Estació de França
  - Buses
    - L95 has a stop just outside the campus, L94 a bit farther. Approx 1 h to/from Barcelona center.
    - Also, from any bus that stops at Castelldefels
    - L99: Direct bus Castelldefels center - Airport Terminal 1
  - Car
    - Parking area close to the Olympic Canal

- Check map and details here

http://eetac.upc.edu/en/the-school/how-to-arrive
Transport tips

● Fares & tickets
  ■ Castelldefels belongs to Zone 1 (cheapest fare)
  ■ Buy integrated tickets (1h15 mins changing between train, metro, bus, and tram). Avoid single tickets – they are much more expensive.
  ■ If you do at least 2 trips/day (14 per week) the monthly and 3-months passes (T-mes and T-trimestre, unlimited trips for 30 or 90 days) are the best option.
  ■ Train delays of more than 15 minutes entitle you to obtain a refund.

● Apps & Twitter for service notifications
  ■ Apps:
    • ADIF (real-time train schedule)
    • Rodalies de Catalunya (train issues)
    • Próximo Bus Barcelona (real-time bus schedule)
  ■ Twitter:
    • @rodalies, @rodalia2, @rod2sudcat
    • @TMB_barcelona, @TMBinfo
EETAC information systems

- **ATENEÀ** [https://atenea.upc.edu/](https://atenea.upc.edu/)
  - An intranet for each course, with materials, assignments, etc
  - Generic courses: EETAC (Catalan), MASTEAM (English)
    with administrative information (normative, schedules, etc)

- **SIA / NetArea** [https://mitra.upc.es/SIA/MAPA.INICI](https://mitra.upc.es/SIA/MAPA.INICI)
  - Qualifications, transcript of records, schedules

- **e-Secretaria** [https://esecretaria.upc.edu/](https://esecretaria.upc.edu/)
  - Personal / academic data
  - Administrative processes: enrolment, academic requests, etc

- All the systems share the same login/password credentials, activated 24h after your enrolment
- The three platforms are accesible from EETAC’s website
MASTEAM Atenea course

Spring 2016 semester - Academic Calendar and Course Schedules

This section contains the following information related to the Spring 2016 semester:

- **Academic calendar** of the 2015/16 year, both in English version (static, as of January 2016), and a link to the current version in Catalan (just in case there is some minor modification)
- **Course schedules**, both in English version (static, as of January 2016), and a link to the current version in Catalan (just in case there is some change)
- **Exam calendars** for the mid-semester (1A1 and 1B1 courses) and end-of-semester (1A2 and 1B2) exam periods, both in English version (static, as of January 2016), and a link to the current version in Catalan (just in case there is some change)
- **Course coordinators and professors**, link to the Catalan version of the list of course coordinators and professors
MASTEAM’s new website – under construction
Institutional e-mail address

**Format:**

name.surname(s)@estudiant.upc.edu

**IMPORTANT!!** You will receive there all the institutional messages from the School and the professors, and course notifications.

- There is no mailbox – it is an alias that forwards messages to your personal e-mail address:
  - Send a message to yourself to check it – it is important
  - Check/update your data at [https://esecretaria.upc.edu/](https://esecretaria.upc.edu/)

**If you need to send e-mails with your institutional address:**

[https://serveistic.upc.edu/ca/correuUPC/faq/correu/enviament-est-upc-edu](https://serveistic.upc.edu/ca/correuUPC/faq/correu/enviament-est-upc-edu)
Access to research databases

IEEEExplore, Springer, etc from UPC or remotely via eBIB UPC

http://bibliotecna.upc.edu/colleccions/ebib-eng
UPC ID card

- Useful for
  - Library loans
  - Access to School after hours
  - Museum & shop discounts
  - …

- Apply for it **as soon as possible**, after enrollment
  - Make sure you have updated your **address in Barcelona** and upload a digital picture to [https://identitatdigital.upc.edu/myid](https://identitatdigital.upc.edu/myid)
  - You should receive it at the designated address in 10-15 days
  - More information at [https://www.upc.edu/identitatdigital/ca/carnetupc](https://www.upc.edu/identitatdigital/ca/carnetupc)
UPC alumni

Courses, resources for your professional career, job opportunities – free for last year students like you – Join!
Work hard, play harder

● Culture
  ■ Language courses (Catalan, Spanish)
    [https://www.upc.edu/slt/en/](https://www.upc.edu/slt/en/)
  ■ Campus Choir
    [https://cbl.upc.edu/ca/el-campus/viure-el-campus/la-coral](https://cbl.upc.edu/ca/el-campus/viure-el-campus/la-coral)
  ■ Catalan Traditions and Folklore
    • Festivities
      – Santa Eulàlia (Barcelona), Feb 12th
      – Sant Jordi, April 23rd
      – Sant Joan, June 24th
    • Castells
      [https://www.facebook.com/GRILLATSCBL/](https://www.facebook.com/GRILLATSCBL/)

● Sports
  ■ UPC Sport Service [http://www.upc.edu/esports](http://www.upc.edu/esports)
  ■ Castelldefels Olympic Canal – Gym
Work hard, play harder

www.bcn.cat filmercommission.com
Interesting links

- **Barcelona City Hall Digital Strategy**
  https://www.youtube.com/watch?v=nDzBH8No9GE

- **5G Barcelona initiative**
  - CTTC - Barcelona aspires to be an European Open Lab of 5G
    http://www.cttc.es/barcelona-aspires-to-be-an-european-open-lab-of-5g/
  - Barcinno - Barcelona Sets Its Sights On Becoming a European 5G Open Lab - http://www.barcinno.com/barcelona-5g-open-lab/
  - El Mundo - Así se prepara el activo que hará de Cataluña un polo global en 5G
  - El País - Barcelona se postula como candidata a ser un laboratorio europeo del 5G - La ciudad crea un consorcio para aprovechar la capitalidad del móvil y atraer fondos europeos para el despliegue de esta tecnología
  - El Mundo - La futura red 5G se testa en Barcelona
QUESTIONS ?
ANNEX - COURSES
1A1

- **Optimization for Applied Engineering Design**
  - *DEPT: ENTEL (3 ECTS)*
  - Optimization with Engineering Applications
  - Nature-Inspired Algorithms. Colonies and Swarms
  - Biogeography-based techniques

- **Network Engineering**
  - *DEPT: ENTEL (3 ECTS)*
  - Introduction to large-scale dynamic systems
  - Network models
  - Competitive and cooperative systems
  - Dynamic systems
1A1

• Next Generation Wireless Communications and IoT
  ➢ DEPT: TSC (3 ECTS)
  ■ 4G/5G networks
  ■ Dense cell deployment: Small Cells, HetNets, Vertical HO
  ■ Spectrum management: cognitive networks
  ■ Cooperative communications: Network Coding
  ■ WSN and Internet of Things

• Sensors and Interfaces
  ➢ DEPT: EEL (3 ECTS)
  ■ Signal chain design
  ■ Sensor performance assessment
  ■ Analog sensors and signal conditioning
  ■ Digital sensors and their interfaces
1A1

- ICT-based Entrepreneurship
  - **DEPT: OE (3 ECTS)**
    - Innovation models
    - Business models of ICT-based companies
    - Customer development. Lean startup concepts
    - Canvas analysis
    - Process analysis
    - Sales for ICT-based startups
1A2

- **IoT and Ubiquitous IP**
  - **DEPT: ENTEL (3 ECTS)**
    - Internet evolution
    - Internet of Things: technologies and applications
    - Wireless experience enhancement
    - Mobility support

- **Next-Generation Optical Networks Infrastructures for Future Cloud-Based Services**
  - **DEPT: TSC (3 ECTS)**
    - Enabling technologies for advanced optical fiber-based networks
    - Optical systems for cloud computing and data centers interconnects
    - Enabling optical systems for energy-efficient optical networks
    - Control/Management plane for optical transport networks
5G Mobile Network Planning
- DEPT: TSC (3 ECTS)
  - Mobile system planning: coverage and capacity optimization
  - Green networks: spectrum and energy efficiency
  - HetNets
  - Self-Organizing Networks (SON)

Body Sensor Nodes
- DEPT: EEL (3 ECTS)
  - Physiological and body position and movement sensors
  - Interference reduction
  - Low-noise sensor interfaces
  - Sensor node implementation (Laboratory project)
1A2

- **Applied Image Processing**
  - **DEPT**: TSC(3 ECTS)
  - Recent advances in 2D and 3D image capture and representation devices.
  - Next generation video coding standards for Ultrahigh-Definition and 3D systems
  - Efficient algorithms for image segmentation
  - Techniques for representation, description and analysis of color, motion and shape
  - Image processing software tools for application oriented design

- **Augmented Reality & Smart Objects**
  - **DEPT**: AC (3 ECTS)
  - Hardware for augmented reality
  - Software and algorithms for augmented reality
  - Smart object typology
  - Applications
1B1

- Network Security Authentication & Authorization
  - DEPT: ENTEL (3 ECTS)
  - Security Introduction
  - Secure Storage of Credentials
  - Passwords/credentials auditing
  - User/service authentication
  - Authenticated services and credential sharing

- Low-power Systems with Energy Harvesting
  - DEPT: EEL (3 ECTS)
  - Low-power embedded systems
  - Analog front and back ends
  - Power Management strategies
  - Battery management and energy supervision
  - Energy harvesting and power conditioning
1B1

- **Software Defined Radio**
  - *DEPT: TSC (3 ECTS)*
  - Cognitive and Software Defined Radio
  - Cloud-RAN
  - Digital signal generation and processing strategies
  - Advanced high-efficient transceiver architectures
  - Linear and nonlinear characterization and compensation

- **Big Data & Data Mining (1B1 + 1B2)**
  - *DEPT: AC (6 ECTS)*
  - Storing big data
  - Processing big data
  - Tools and techniques to analyze big data
  - Automatic recognition of patterns in large data set
  - Recommender systems
1B2

- **Service Engineering**
  - **DEPT: ENTEL (3 ECTS)**
    - Introduction to networked services
    - Dimensioning of services
    - Provisioning of telecom services
    - Operations Management
    - Conclusions, Advanced topics and Future trends

- **Creativity & Engineering**
  - **DEPT: TSC (3 ECTS)**
    - Problem solving and killer applications
    - Critical thinking and the role of the mind in learning
    - Promoting creativity and team leadership
    - Creative techniques
1B2

- **Project on ICT-based Business Models**
  - **DEPT: OE (3 ECTS)**
    - Planning activities to develop a new business model
    - Project management
    - Generation of an innovative idea (students project, first part)
    - Activity plan to develop a new business model (students project, second part)
    - Selling the project (students project, third part)

- **Master Thesis**
  - **DEPT: all (12 ECTS)**