



# MASTEAM

## MASTER IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT

6/6/2018



UNIVERSITAT POLITÈCNICA DE CATALUNYA  
BARCELONATECH

Escola d'Enginyeria de Telecomunicació  
i Aeroespacial de Castelldefels



# UNIVERSITAT POLITÈCNICA DE CATALUNYA (UPC)

BARCELONATECH



## UPC – Rankings as of Feb 2018



### Academic Ranking of World Universities (ARWU) - Shanghai

In the 234-267 rank in Europe and the 17-22 rank in Spain



### Times Higher Education (THE) WUR

In the 200-251 rank in Europe and the 6-7 rank in Spain



### QS World University Rankings

120th in Europe and 6th in Spain



### Academic Ranking of World Universities (ARWU) Shanghai

Engineering, Technology and Computer Science (2016)

In the 76-100 rank globally and the 2nd rank in Spain



### QS World University Rankings by Subject

Engineering and Technology

24th in Europe and 2nd in Spain



### Times Higher Education (THE) by Subject

Computer Science

In the 40-53 rank in Europe and 1st in Spain



## UPC – Rankings as of Feb 2018



### Times Higher Education (THE) Young University Rankings

In the 60-86 rank in Europe and the 5-7 rank in Spain



### ShanghaiRanking's Global Ranking of Academic Subjects

Instruments Science & Technology

8th globally and 1st in Spain



### QS World University Rankings – Top 50 under 50

8th in Europe and 3rd in Spain



### QS World University Rankings by Subject

Architecture and the Built Environment

9th 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

8th in Europe and 1st in Spain



## 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 – MASTTEAM groups involved
- i2Cat, UPC, CTTC, Atos, Telefonica, MWCcapital, local & regional government, among other partners
- Presence of local partners in 22 out of 37 5G H2020 EU projects



# 5G Barcelona field trial

**5G Barcelona**

Home

5G

5G  
Barcelona

Who we  
are

The  
ThinX

News

Contact



## 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



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# MASTEAM

## MASTER IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT





## MASTEAM

- Master in **Telecommunications Engineering**, with emphasis in
  - Internet of Things
  - Smart Cities
  - Mobility – 5G
  - Management

Areas: sensors, embedded systems, radiocommunications, optical communications, signal processing, IP protocols and services, network security, programming, data analytics and big data, project management, business plans

- **Official** program, accredited by Ministerio & Generalitat
  - Access to PhD program
  - Grants



# MASTEAM

- “Mejores 5 másteres de Ingeniería en España 2016”  
<http://www.elmundo.es/mejores-masters/ingenieria.html>

Mejores Másteres de Inge... x Buscar | LinkedIn x +

www.elmundo.es/mejores-masters/ingenieria.html linkedin

EM España Opinión Internacional Economía Sociedad Deportes Cultura Ciencia Tecnología Tv Más

Inicio > Másteres

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**Applied Telecommunications and Engineering Management** **5º puesto** Universidad Politécnica de Cataluña

Destaca por sus contenidos actualizados y punteros, la activa metodología de aprendizaje, la internacionalización y la adaptación a las necesidades de la industria.

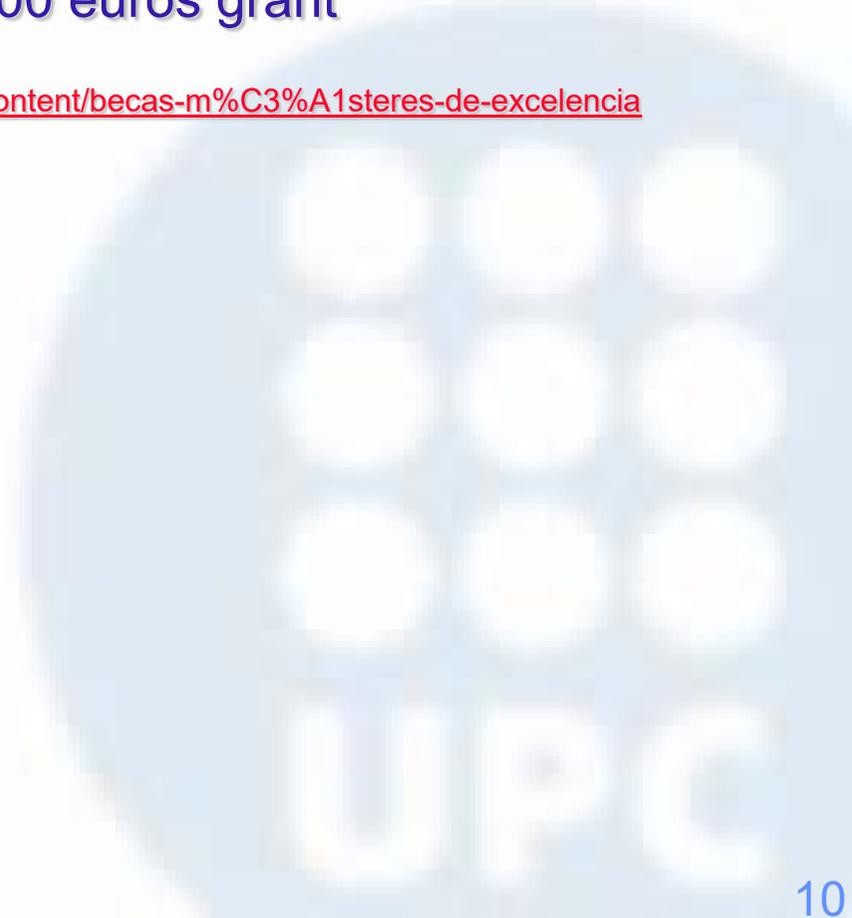
**Sede:** Barcelona  
**Teléfono:** 934 137 056  
<http://eetac.upc.edu/en/masteam>  
**Nº de plazas:** 30  
**Duración:** 60 ECTS  
**Precio:** 3.266 Euros



## 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
```

```
lpwan Working Group                                A. Minaburo  
Internet-Draft                                    Acklio  
Intended status: Informational                     L. Toutain  
Expires: September 3, 2017                         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

- W

## UPC patents contact with

The Universitat de Catalunya has developed a device that can provide a cardiovascular health check by simply holding a smartphone in contact with the heart (electrocardiogram) using two metal electrodes. The device was patented in the United States and China, and will be presented next week at the Mobile World Congress in Barcelona.

Cardiovascular diseases are the leading cause of death in the world, accounting for a total of 17.5 million deaths annually. The device is a simple and portable tool used for cardiovascular health checks.

Now, researchers have developed an electrocardiogram device that is more accurate than those offered by existing devices, especially in areas with poor phone coverage.



## ed on

that can measure the activity of the heart using two metal electrodes. The device was patented in the United States and China, and will be presented next week at the Mobile World Congress in Barcelona.

7/02/2017

translates the data into a simple format that can be used for health checks.

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## Faculty & Research

- W

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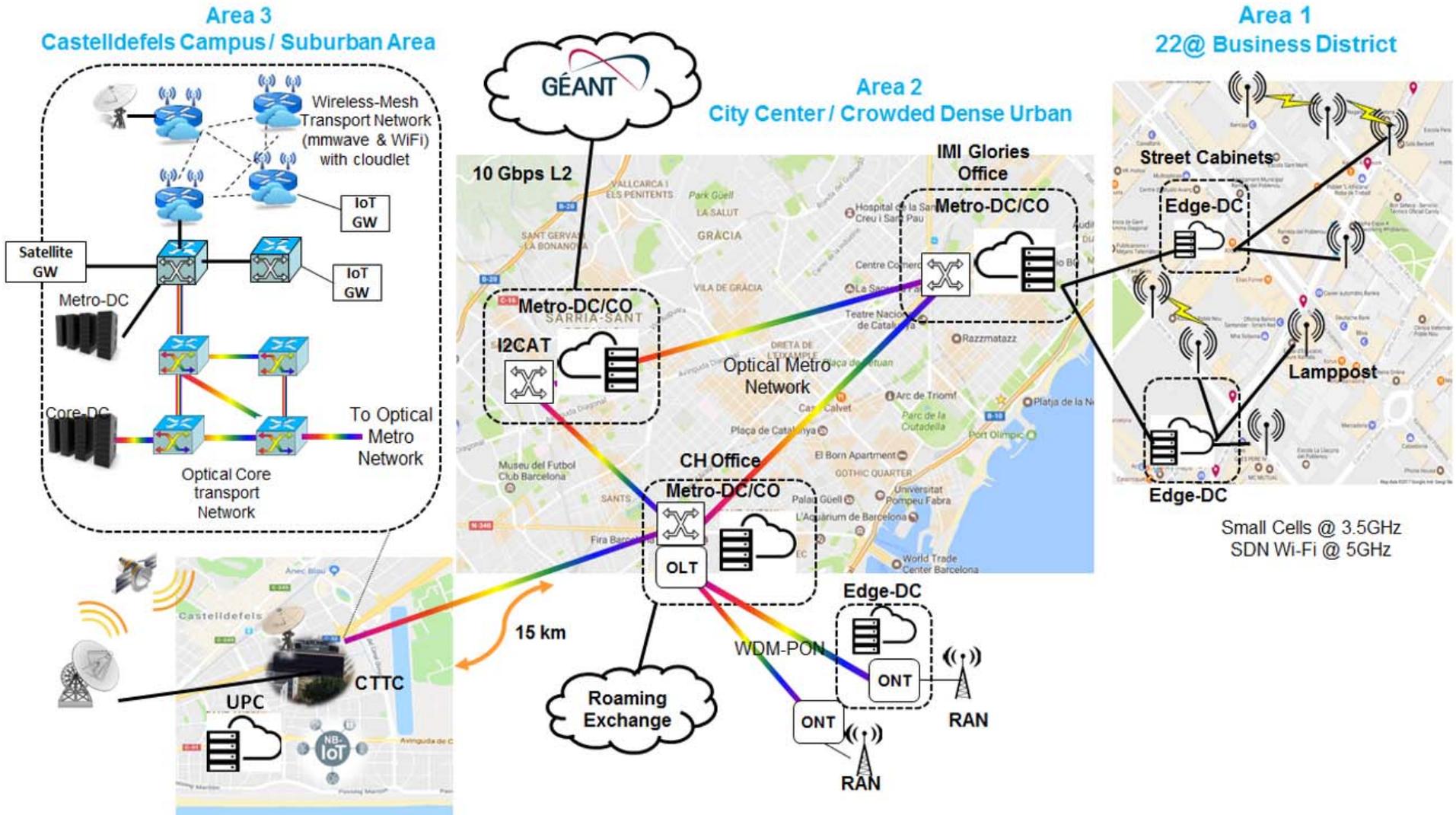
7/02/2017

translates  
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# 5G Barcelona field trial





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## Alumni

- LinkedIn:  
170+  
contacts

in masteam

176 resultados para: **masteam**

Buscar Avanzada >

**Todos**

- Personas
- Empleos
- Empresas
- Grupos
- Universidades
- Publicaciones
- Buzón

**Relación**

- Todos
- Contactos de 1er grado
- Contactos de 2º grado
- Miembros del grupo
- Contactos de 3er grado + t...

**Ubicación**

- Todos
- España (140)
- Barcelona y alrededor... (129)
- Reino Unido (7)
- Suecia (5)
- Alemania (4)
- + Añadir

**Empresa actual**

- Lucia Medina <sup>2º</sup>  
Project Manager at Bragi  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 11 contactos compartidos • Similares
- David García Gómez <sup>2º</sup>  
National Service Manager at Vodafone Global  
Enterprise  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 16 contactos compartidos • Similares
- David Salinas <sup>2º</sup>  
CTO at myBus GmbH  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 6 contactos compartidos • Similares
- María López Ramírez <sup>2º</sup>  
Project manager in SEAT, S.A.  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 11 contactos compartidos • Similares
- Javier Rodríguez <sup>2º</sup>  
Inside Sales Account Manager en Hewlett Packard  
Enterprise  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 19 contactos compartidos • Similares
- Toni Carens Roca <sup>2º</sup>  
Consultor SAP BI: BW-BO-BPC-HANA  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 21 contactos compartidos • Similares
- David Arance Garcia <sup>2º</sup>  
Responsable Soluciones Seguridad en CleverTask IT  
Solutions  
Barcelona y alrededores,  
España • Telecomunicaciones  
▶ 8 contactos compartidos • Similares
- Macarena Palau Zaidín <sup>2º</sup>  
Product Developer at VozTelecom



# Alumni

- LinkedIn:  
170+  
contacts

The screenshot shows a LinkedIn search for 'masteam'. The search results are filtered by 'Avanzada' and show a list of 10 profiles. The profiles are: Antoni Serra Font (QA Engineer at K-LAGAN), Anna Ortiz Mazarico (Business Intelligence Consultant at Abast), Miguel Carretero Rodríguez (Coordinador Adjunto en F. INICIATIVAS), Alba Boj Sugrañes (Product Manager | Banca online), Miguel Angel Granado (National Service Manager at Vodafone Global Enterprise), Elisabet Berbel Gonzalez (Java Analyst en eDreams ODIGEO), Lara Marin (Consultant on Business Analytics en Minsait by Indra), and Xavier Barrera Quintanilla (Senior Software Engineer and Product Owner at TomTom Telematics). The search results are organized into sections: 'Relación' (Todos, Contactos de 1er grado, Contactos de 2º grado, Miembros del grupo, Contactos de 3er grado + t...), 'Ubicación' (Todos, España (140), Barcelona y alrededores... (129), Reino Unido (7), Suecia (5), Alemania (4), + Añadir), and 'Empresa actual' (Todos).



## Structure

- 60 ECTS
  - 1 year at full-time, or 1.5, 2 or more at part-time
  - 1 ECTS = 9h of classroom activities + 16 h of autonomous activities
- **Mandatory** contents: 15 ECTS
- **Optional** contents: 33 ECTS
  - Total optional offer: 42 ECTS
- **Master Thesis: 12 ECTS**
  - Performed during 2<sup>nd</sup> semester (full-time) or later



### Semester 1A (14 weeks)

#### 1A1 (7 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)

#### 1A2 (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)

#### 1B1

Network Security Authentication & Authorization (3)

Low-power Systems with Energy Harvesting (3)

Software Defined Radio (3)

Big Data & Data Mining (6)

Master Thesis (12)

#### 1B2

Service Engineering (3)

Creativity & Engineering (3)

Project on ICT-based Business Models (3)

In parenthesis, the number of ECTS credits

Mandatory course

Optional course



## Mobility, Double Degree, Internships

- **Master Thesis** in more than 30 institutions in Europe, China, Mexico...
- **Double Degree** agreements
  - 1 year MASTREAM + 1 year abroad = **2 master degrees**
    - University of **L'Aquila** (Italy)
    - **Cranfield** University (UK) – 8 different masters (automotive, aeronautical communications, etc)
    - Currently finishing agreements with **KTH** (Stockholm - SWE), **IST** (Lisbon - PT), **Karlstad** (SWE)...
- **Internships**
  - Up to 600h, paid

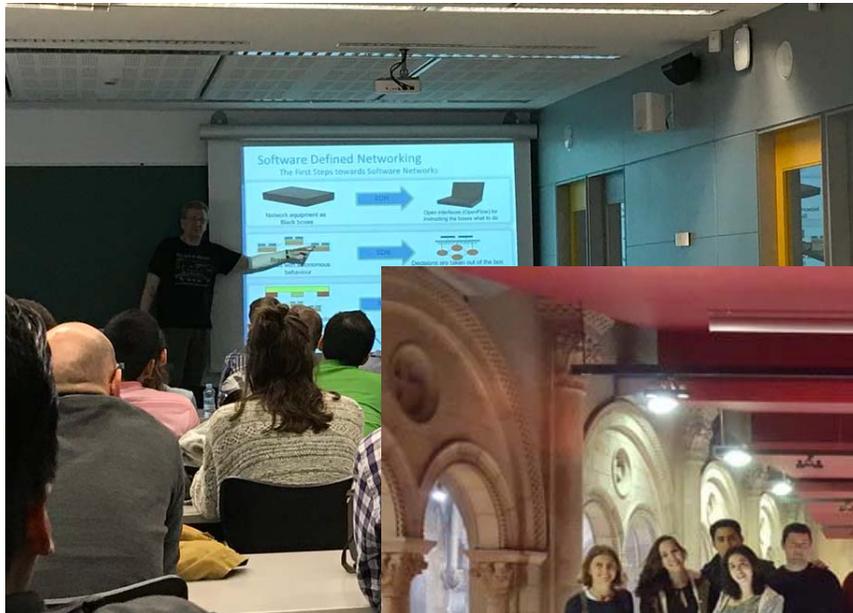


## Internships / Cooperation with companies

- Master Theses, Internships
- Currently we have **more demand** from companies than available students!
- MASTEAM talks and presentations
  - Cellnex: SIGFOX technology, business models
  - Ficosa/Idneo: Connected car, Project management
  - Ajuntament Barcelona: Smart City network, Security
  - Datumize: Dark Data and IoT
  - Schibsted: Networking in Container/Docker environments
  - ... check the EETAC website!



# Weekly talks, seminars, visits





MASTEAM talks - Building...

eetac.upc.edu/ca/esdeveniments/masteam-talks-building-qua

# 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).

Quan	09/11/2016 de 17:30 a 18:30
On	C4-001
Persona de contacte	David Rincón
Telèfon de contacte	37056
Afegeix un esdeveniment al calendari	<a href="#">iCal</a>



**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](#)



# QUESTIONS ?

More info at <https://eetac.upc.edu/en/study/masters-degrees/masteam>



# 1A1

- **Optimization for Applied Engineering Design**
  - *DEPT: ENTEL (3)*
    - Optimization with Engineering Applications
    - Optimization Heuristics. Algorithms and complexity. Convergence
    - Nature-Inspired Algorithms. Colonies and Swarms
    - Biogeography-based techniques
- **Network Engineering**
  - *DEPT: ENTEL (3)*
    - Introduction to large-scale dynamic systems
    - Network models
    - Competitive and cooperative systems
    - Dynamic systems

## 1A1

- **Next Generation Wireless Communications and IoT**
  - *DEPT: TSC (3)*
    - 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)*
    - Signal chain design
    - Sensor performance assessment
    - Analog sensors and signal conditioning
    - Digital sensors and their interfaces
    - Signal chain design



## 1A1

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

## 1A2

- **Next-Generation Optical Networks Infrastructures for Future Cloud-Based Services**
  - *DEPT: TSC (3)*
    - 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
- **IoT and Ubiquitous IP**
  - *DEPT: ENTEL (3)*
    - Internet evolution
    - Internet of Things: technologies and applications
    - Wireless experience enhancement
    - Mobility support

## 1A2

- **5G Mobile Network Planning**
  - *DEPT: TSC (3)*
    - Mobile system planning: coverage and capacity optimization
    - Green networks: spectrum and energy efficiency
    - HetNets
    - Self-Organizing Networks (SON)
    - Radio Resource Management and interference coordination.
  
- **Applied Image Processing**
  - *DEPT: TSC(3)*
    - 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

## 1A2

- **Low-power Systems with Energy Harvesting**
  - *DEPT: EEL (3)*
    - Low-power embedded systems
    - Analog front and back ends
    - Power Management strategies
    - Battery management and energy supervision
    - Energy harvesting and power conditioning
  
- **Augmented Reality & Smart Objects**
  - *DEPT: AC (3)*
    - Hardware for augmented reality
    - Software and algorithms for augmented reality
    - Smart object typology
    - Applications



## 1B1

- **Service Engineering**

- *DEPT: ENTEL (3)*

- Introduction to networked services
- Dimensioning of services
- Provisioning of telecom services
- Operations Management
- Conclusions, Advanced topics and Future trends

- **Body Sensor Nodes**

- *DEPT: EEL (3)*

- Physiological and body position and movement sensors
- Low-noise sensor interfaces
- Interference reduction
- Sensor node implementation (Laboratory project)

## 1B1

- **Creativity & Engineering**

- **DEPT: OE\* (3)**

- **Problem solving and killer applications**
- **Critical thinking and the role of the mind in learning**
- **Promoting creativity and team leadership**
- **Creative techniques**

\* Coordinated by Professor A. Elias (TSC)

- **Big Data & Data Mining**

- **DEPT: AC (6)**

- **Storing big data**
- **Processing big data**
- **Tools and techniques to analyze big data**
- **Automatic recognition of patterns in large data set**
- **Recommender systems**

## 1B2

- **Network Security Authentication & Authorization**

- *DEPT: ENTEL (3)*

- Security Introduction
    - Secure Storage of Credentials
    - Passwords/credentials auditing
    - User/service authentication
    - Authenticated services and credential sharing

- **Software Defined Radio**

- *DEPT: TSC (3)*

- Cognitive and Software Defined Radio
    - Cloud-RAN
    - Digital signal generation and processing strategies
    - Advanced high-efficient transceiver architectures
    - Linear and nonlinear characterization and compensation

## 1B2

- **Project on ICT-based Business Models**
  - ***DEPT: OE (3)***
    - **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)**