MASTEAM - MATT

Welcome meeting

Autumn 2021 intake

8th September 2021
Outline

- Institutional presentation
  - Your university, campus, and school

- MASTEAM and MATT masters
  Course structure, academic details, etc

- Practical information
  Legal aspects, information systems, etc
YOUR UNIVERSITY

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

- UPC, the Technical University of Catalonia
  - Founded in 1971, from century-old schools
  - 18 schools in 6 cities and 9 campuses

https://www.youtube.com/watch?v=wDyRDtz-uho
Facts & figures

● UPC Figures (course 2020-21)
  ■ 30000 students
    ● of which 22700 at bachelor, 5200 at masters, and 2200 in PhD programs
    ● 1300 incoming mobility students per year
  ■ 3100 teaching and research staff
  ■ 2000 administrative and service staff
  
http://www.upc.edu/en/the-upc/the-institution/facts-figures

● Well positioned in rankings (specifically in the ICT field) and presence in European research projects
Facts & figures – Rankings as of 2021

QS World University Rankings by Subject, 2021

Shanghai Global Ranking of Academic Subjects, 2021

https://www.upc.edu/ranquings/en
UPC Facts & figures

Top Spanish university as recipient of funding from EU Horizon 2020 research projects, and among the first positions at the European level

5G Barcelona

- Local and EU H2020 research project – many MASTEAM professors involved
- **i2Cat, UPC, CTTC**, Atos, Telefonica, MWCapital, local & regional government, among other partners
- Presence of local partners in 22 out of the 37 5G-related H2020 EU projects

https://5gbarcelona.org/en-labs/ Interactive city pilot [https://www.youtube.com/watch?v=rO3Lq-Gg0wA](https://www.youtube.com/watch?v=rO3Lq-Gg0wA)
5G Barcelona field trial

[Diagram illustrating network connections and areas]
Faculty & Research

- World-class research in the areas of the master

Carles Gomez

Roles

Chair of IPv6 over Networks of Resource-constrained Nodes (6lo)  carlesgo@entel.upc.edu
Reviewer in Internet of Things Directorate (iotdir)  carlesgo@entel.upc.edu

RFCs (5)

<table>
<thead>
<tr>
<th>RFC</th>
<th>Date</th>
<th>Title</th>
<th>Cited by</th>
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<tbody>
<tr>
<td>rfc6606</td>
<td>May 2012</td>
<td>Problem Statement and Requirements for IPv6 over Low-Power Wireless Personal Area Network (6LoWPAN) Routing</td>
<td>8 RFCs</td>
</tr>
<tr>
<td>rfc7668</td>
<td>Oct 2015</td>
<td>IPv6 over BLUETOOTH(R) Low Energy</td>
<td>9 RFCs</td>
</tr>
<tr>
<td>rfc8352</td>
<td>Apr 2018</td>
<td>Energy-Efficient Features of Internet of Things Protocols</td>
<td>1 RFC</td>
</tr>
<tr>
<td>rfc8724</td>
<td>Apr 2020</td>
<td>SGHC: Generic Framework for Static Context Header Compression and Fragmentation</td>
<td>5 RFCs</td>
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<tr>
<td>rfc9006</td>
<td>Mar 2021</td>
<td>TCP Usage Guidance in the Internet of Things (IoT)</td>
<td></td>
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</table>

Active Drafts (5)

- draft-ietf-6lo-use-cases
- draft-gomez-6lo-schc-15dot4
- draft-ietf-lpwan-schc-over-sigfox
- draft-ietf-lpwan-schc-compound-ack
- draft-ietf-6lo-blenosh

Expired Drafts excluding replaced drafts

- draft-gomez-tcpm-ack-rate-request
- draft-gomez-6lo-schc-dispatch
- draft-gomez-tcpm-delack-suppr-reqs
- draft-ietf-core-cocoa
- draft-bormann-lwig-7228bis
- draft-gomez-tcpm-ack-pull
- draft-gomez-frag-lpwan-considerations
Faculty & Research

The IEEE Communications Society Charles Kao Award for Best Optical Communications & Networking Paper

Prize
Plaque and honorarium of US$500 per author (up to a maximum total of US$2,000). If there are more than four authors, the maximum of US$2,000 would be split between each author.

Description
Award to recognize the best paper published in the *IEEE/OSA Journal of Optical Communications and Networking*.

2019 Award Recipients
Jordi Perelló, Joan M. Gené, Albert Pagès, Jose A. Lazaro, Salvatore Spadaro

The UPC participates in a European trial of a treatment to reduce mortality of cardiogenic shock

The EURO SHOCK trial includes the main cardiovascular hospitals in nine European countries. The UPC is participating in the project with CardioSense, a device that provides an early cardiovascular diagnosis in less than 60 seconds. Over 400 patients will participate in the trial, which will begin on 1 February and continue for 34 months.

Jan 16, 2019

Cardiogenic shock is a very complex clinical condition that entails a reduction of blood flow in the most important organs of the human body due to a massive myocardial infarction. More than 50,000 patients are diagnosed this condition in Europe every year, and women and elderly patients have the worst prognosis. The last major breakthrough in this field was around 20 years ago, when it was shown that the prognosis could be improved by urgent reopening of the occluded coronary artery that causes the myocardial infarction and leads to the cardiogenic shock. However, despite several recent attempts to improve the survival of patients with this condition, no significant improvement in mortality has yet been achieved. Most patients with cardiogenic shock end up with multiple organ dysfunction syndrome, which has a mortality rate of around 50% during the first 30 days after its appearance.

The EURO SHOCK project is funded by the European Union’s Horizon 2020. Research and Innovation programme is the first large-scale clinical trial to investigate the early application of extracorporeal membrane oxygenation (ECMO) to reduce mortality associated with cardiogenic shock. ECMO is a type of mechanical circulatory support with which deoxygenated blood is extracted from the patient’s veins, enriched with oxygen and administered directly to the arterial system, thus preserving the body’s critical organs during the most serious stage of the disease. In the European trial scheduled to begin on 1 February, patients will receive an immediate revascularisation to open the occluded artery (a stent angioplasty). If they give their informed consent, they will be randomised to receive either a standard treatment or the same treatment with the application of ECMO in the first few hours after the diagnosis of cardiogenic shock.

A team of researchers from the Universitat Politècnica de Catalunya - BarcelonaTech (UPC) and the August Pi i Sunyer Biomedical Research Institute (IDIBAPS) - Hospital Clinic de Barcelona are participating in the project with CardioSense, a cardiovascular monitor that provides an early diagnosis with more accurate results than the current ones in less than 60 seconds. The results can be transmitted from anywhere with cell phone coverage. This “heart watchman” patented by the UPC detects both the electrocardiogram (the conventional signal of the heart’s electrical activity) and the arterial pulse wave velocity (related to blood pressure and arterial elasticity) through sensors touched by the patient’s hands or feet. The sensors can be placed on cell phone cases, tablets, watch straps, scales, steering wheels, handles or any other object that can be touched with both the user’s hands or feet at once. This system, developed by researchers of the UPC’s Instrumentation, Sensors and Interfaces Group (ISI) headed by
The UPC, a major player in the development of Industry 4.0

Of students now attending primary school, 63% will end up working in a job that does not yet exist. This disturbing fact is closely related to what is known as the fourth industrial revolution, Industry 4.0, which is transforming industry through a combination of production methods and advanced information technologies to make manufacturing adaptive and flexible. The main challenge is to make all the information available in real time by integrating the entities that make up the value chain.

Jan 09, 2019

Industry 4.0, recognised as an emerging sector in Catalonia and elsewhere, will interconnect people, machines and systems in a different way. Governments of countries and regions are striving to consolidate this transformation by promoting skills-building, training and new professional profiles in order to minimise the social disruption that it may cause.

The Universitat Politècnica de Catalunya (UPC) is one of the main agents for the development of Industry 4.0 in Catalonia, and a large part of its academic activity is directly or partially linked to valorising and capitalising on existing knowledge and accelerating knowledge creation. In fact, the UPC is already working to identify the lines of research and knowledge transfer and course offerings that will provide knowledge and talent for the technological bases of Industry 4.0.

In total, one hundred of the UPC's research groups are related to the principles of Industry 4.0, and around fifty of them are participating directly in relevant projects. Also, about 40 of the UPC's master's degrees cover all the technologies involved in this field. In this scenario, "the UPC must be a scientific and technological hub of this new paradigm of industrial production in the digital age", explains Professor Luis Romeral, co-director of the Motion Control and Industrial Applications Research Centre (MCIA), which specialises in predictive maintenance for the industrial sector, technology based on the industrial internet of things, and big data analytics. The MCIA aims to predict failures and defects in the operation of industrial machinery, avoid emergency stoppages and dead times, and gain efficiency and productivity.
The Connected Factory project about Industry 4.0 will be lead from EETAC

The Broadband Networks and Services research group at EETAC (Castelldefels UPC Campus) will be leading the Connected Factory project within the Looming Factory initiative, an alliance between R+D+i groups from academia and industry.

The goal of Looming Factory is to accelerate the introduction in the market of emergent technologies aligned with the needs and new challenges of the digital transformation within the industrial sector: intelligent and connected factories, interconnection of machines and systems, the operational integration of the production environment, and the exchange of information with the logistics and distribution systems. The alliance, fostered by the RIS3CAT programme of Generalitat de Catalunya and FEDER (European Union) comprises four different projects with a global investment of 4 million euros, in a time frame of three years:

- Smart Factory: advanced monitoring of industrial facilities.
- Robots on Factory: challenges caused by the introduction of robotics in production lines.
- Factories of the Future: demonstrators of the other three projects.

Connected Factory will be lead by Associate Prof. David Remondo (BAMPLA) from the Castelldefels Campus of UPC.

More information (in Catalan):

- La UPC lidera dues aliances estratègiques per desenvolupar tecnologies emergents en impressió 3D i Indústria 4.0
MASTEAM Alumni

- 93% of employed alumni
- 76% find a job in less than 3 months
- LinkedIn: 220+ contacts
MASTEAM Alumni

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- 76% find a job in less than 3 months
- LinkedIn: 220+ contacts
YOUR CAMPUS

CAMPUS DEL BAIX LLOBREGAT (CBL)
PARC MEDITERRANI DE LA TECNOLOGIA (PMT)
Work hard, play harder.
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=tXwZwET0tl0
European Space Agency - Business Incubator (BIC)
Institute of Photonic Sciences

Institut de Ciències Fotòniques
Telecommunications Technology
Centre of Catalonia
School of Agricultural Engineering of Barcelona - UPC
International Center for Numerical Methods in Engineering (UPC, building shared with EETAC)
i2cat Foundation (Internet 2 Catalonia)
Companies established at the PMT

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<td>BCN3D Technologies</td>
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<td>DAPCOM</td>
<td>Cosingo - Imagine Optic Spain</td>
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<td>alterAid</td>
<td>FOOD &amp; MUSIC</td>
<td>Thrombotargets Europe</td>
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<td>Almodis Solutions</td>
<td>FROM BCN</td>
<td>GeoNumerics</td>
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<td>Smooth Bytes</td>
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<tr>
<td>smooth bytes</td>
<td>IRIS</td>
<td>rr-consult</td>
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</table>
D7 or Campus building – common services
Campus Library (D7)

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
Canteen (D7)

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

Pius Font i Quer Residence

- 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
YOUR SCHOOL

CASTELLDEFELFS 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 – MASTREAM (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 – MASTREAM (1 year)
- 2019 – MATT (1 year), joint program with ETSETB
C4 building: classrooms, labs, teacher offices, research
C3 building: teacher offices, research labs + CIMNE
C3 & C4 buildings

Train station (through the bridge)

Main door

Parking and Olympic canal

C4

C3

Door

Red tower

Blue tower

Yellow tower

Faculty offices
## Academic Programs

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

<table>
<thead>
<tr>
<th>Master degrees</th>
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<tbody>
<tr>
<td>Master of Science in Telecommunication Engineering &amp; Management (MASTEAM) – 1 year</td>
</tr>
<tr>
<td>Master in Advanced Telecommunications Technologies (MATT) – 1 year</td>
</tr>
<tr>
<td>Master in Aerospace Science And Technology (MAST) – 1 year</td>
</tr>
<tr>
<td>Master in Air Navigation and Airports (temporarily discontinued)</td>
</tr>
<tr>
<td>Master in Unmanned Aircraft (Drones) Systems Engineering (MED) – 1 year</td>
</tr>
<tr>
<td>Master in Aeronautical Engineering (MUEA) – Specialization in Air Navigation (2 years, 1 at ESEIAAT + 1 at EETAC)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PhD programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EETAC professors collaborate in the following PhD programs at UPC:</td>
</tr>
<tr>
<td>• Electronic Engineering</td>
</tr>
<tr>
<td>• Network Engineering (Telematics)</td>
</tr>
<tr>
<td>• Signal Theory and Communications</td>
</tr>
<tr>
<td>• Computer Science</td>
</tr>
<tr>
<td>• Management and Business Organization</td>
</tr>
<tr>
<td>• Aerospace Science and Technology</td>
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</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>Electronics Engineering</td>
</tr>
<tr>
<td>20</td>
<td>12</td>
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<tr>
<td>Network Engineering (Telematics)</td>
<td>Physics and Nuclear Engineering</td>
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<tr>
<td>20</td>
<td>1</td>
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<tr>
<td>Management and Business Organization</td>
<td>Institute of Energy Technology</td>
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<tr>
<td>15</td>
<td>2</td>
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<tr>
<td>Signal Theory and Communications</td>
<td>Applied Mathematics I</td>
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<tr>
<td>35</td>
<td>1</td>
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<tr>
<td>Construction Engineering</td>
<td>Applied Mathematics IV</td>
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<tr>
<td>1</td>
<td>15</td>
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<tr>
<td>Applied Physics and Aeronautics Engineering</td>
<td>Graphical Expression in Engineering</td>
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<tr>
<td>34</td>
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<tr>
<td>Materials and Structure Engineering</td>
<td>Agri-Food Engineering and Biotechnology</td>
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<tr>
<td>2</td>
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<tr>
<td>Geotechnical Engineering and Geo-Sciences</td>
<td>Control theory and industrial computers</td>
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<td>4</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>165</strong></td>
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</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

MATT
MASTER IN ADVANCED TELECOMMUNICATIONS TECHNOLOGIES
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.

- Our master’s degrees are 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.

- We focus on 5G and IoT
Scope and Objectives – 5G

5G Scenario as foreseen by ITU
Scope and Objectives – Internet of Things

- Optical networks, IP protocols, SDN
- Radiocomms, protocols, SDR
- Data centers, networks, protocols, SDN, NFV, Big Data
- Electronics, low-power
- Business models, service management

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 Network Security, and aspects such as 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 MASTTEAM and MATT

● Workload: 60 ECTS credits = 1500h

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

- Optional contents: 33 ECTS
  - MASTTEAM: any combination of 33 ECTS from an offer of 45 ECTS
  - MATT: the elective contents are fixed for both the 5G and IoT tracks

- Master Thesis: 12 ECTS
MASTEAM – course structure

Master's degree in **Applied Telecommunications And Engineering Management (MASTEAM)**

<table>
<thead>
<tr>
<th>Block</th>
<th>Course</th>
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<tbody>
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<tr>
<td>A2</td>
<td>OPTICAL</td>
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<tr>
<td>B1</td>
<td>BIGDATA</td>
<td>6 ECTS</td>
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<td>B2</td>
<td>SERVICE</td>
<td>3 ECTS</td>
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<td>NETENG</td>
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<td>IMAGE</td>
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<td>IOT-IP</td>
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<td>SDR</td>
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<td>SENSORS</td>
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<td>BODYSEN</td>
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<td>5GNET</td>
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<td>WICOM</td>
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<td>5GPLAN</td>
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<td>LOWPOW</td>
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<tr>
<td>Master Thesis</td>
<td>12 ECTS</td>
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</table>

**Legend:**
- **Blue**  Mandatory courses (15 ECTS)
- **Yellow** Elective courses (33 ECTS out of a total offer of 45 ECTS)
- **Check** Master’s thesis (12 ECTS)
MATT – course structure

Master's degree in Advanced Telecommunications Technologies (MATT)

Track: 5G NETWORKS
- MLEARN 5 ECTS
- ARQSOFT 5 ECTS
- EWOC 5 ECTS
- OPTECH 5 ECTS
- NETSCI 5 ECTS
- MOBCOMM 5 ECTS

Track: INTERNET OF THINGS
- 5GNET 3 ECTS
- IOT-IP 3 ECTS
- SGPLAN 3 ECTS
- MASTER THESIS
- SENSORS 3 ECTS
- IOT-IP 3 ECTS
- LOWPOW 3 ECTS
- BODYSN 3 ECTS
- SDR 3 ECTS
- NETAUTH 3 ECTS

Legend:
- Mandatory courses for all tracks (15 ECTS)
- Elective courses (33 ECTS)
- Master’s thesis (12 ECTS)
Course sequence constraints

- Some of the mandatory courses are **pre-requisite** before taking some elective courses (hard constraint), or **recommended** (soft constraint)

- MASTTEAM
  - WICOM is **pre-requisite** of 5GNET, 5GPLAN, and SDR
  - ENTREP is **pre-requisite** of BUSINESS (but both courses can be enrolled in the same semester and be taken consecutively)
  - WICOM is recommended before IOT-IP
  - SENSORS is recommended before BODYSEN

- MATT
  - MOBCOMM is **pre-requisite** of 5GNET, 5GPLAN, and SDR
  - MOBCOMM is recommended before IOT-IP
  - SENSORS is recommended before BODYSEN
Calendar and Course Schedule

- Published in the school and MASTEAM websites and Atenea’s MASTEAM course
  - Organized in 13 to 15 actual weeks, but only 13 complete weeks
  - Holidays
  - Adjustments such as “October 14th becomes a Tuesday”

- 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 18:00h
  - Research talks, companies, academic meetings
  - Attendance is mandatory—they are part of the program
# Academic Calendar (Autumn 2021)

## September 2021

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## October 2021

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## January 2022

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## February 2022

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Colors indicate:
- School day
- Non school day
- Holiday
- School day (activity restricted)
- Exams
- Laboratory Exams
- Marks publication deadline (12h)
- Marks revision deadline (12h)
# Course schedules

**MASTEAM (Autumn 2021)**

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
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<tbody>
<tr>
<td>15:00-15:30</td>
<td>SENSORS 021B</td>
<td>NETENG 021B</td>
<td>OPTIM 021B / 334G</td>
<td>WICOM 021B</td>
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<tr>
<td>15:30-16:00</td>
<td>SENSORS 021B</td>
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<td>OPTIM 021B / 334G</td>
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**A1 courses - Weeks 1 to 7 + exams week in Oct/November 2021**

**Legend:**
- SENSORS 021B: Sensors and Interfaces
- NETENG 021B: Network Engineering
- WICOM 021B: Next Generation Wireless Communications and IoT
- OPTIM 021B / 334G: Optimization for Applied Engineering Design
- ENTREP 021B: ICT-based Entrepreneurship
- Talks/meetings

*(only on week 4)*
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<thead>
<tr>
<th>MONDAY</th>
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<tbody>
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<td>CREA 021B</td>
<td>BODYSENS 021B / 226B</td>
<td>BUSINESS 021B (15:00 to 17:30 on weeks 8, 10 and 12, 15:30 to 17:30 on weeks 9, 11 and 13)</td>
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<td>IMAGE 021B</td>
<td>CREA 021B</td>
<td>15:00-17:30 on weeks 8 &amp; 9, 15:00-17:00 on weeks 10, 11, 12, 13, 14)</td>
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<td>20:30-21:00</td>
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</table>
BIGDATA  Big Data and Data Mining
IOT-IP    Internet of Things and Ubiquitous IP
5GPLAN   5G Mobile Network Planning
5GNET    Network Support for 5G
LOWPOW   Low-power Systems with Energy Harvesting

B1 courses - Weeks 1 to 7 + exams week in Oct/November 2021

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**B2 courses - Weeks 8 to 16 + exams week in January 2022**

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<td>SDR 021B / 330B</td>
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Talks/meetings
**Course schedules**

**MATT (Autumn 2021)**

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<td>NETSCI 021B</td>
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<td>MOBCOMM 021B</td>
<td>EWOC 329B</td>
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</table>

**Courses**:
- MLEARN: Machine Learning from Data
- ARQSOFT: Software Architecture
- EWOC: Entrepreneurship for World Challenges
- OPTECH: Optimization Techniques
- NETENG: Network Engineering
- MOBCOMM: Mobile Communications

**Notes**:
- Weeks 1 to 7 + exams week in Oct/November 2021
- MOBCOMM 329B / 333G
- ARQSOFT 133V
- Talks/meetings
# Weekly Schedule

**Weeks 8 to 15 + final exams week in January 2022**

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<td>MEETSCI 022B</td>
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</tbody>
</table>

**Courses**

- **ARQSOFT** - Software Architecture
- **NETSCI** - Network Science
- **NETENG** - Network Engineering
- **MOBCOMM** - Mobile Communications
- **MLEARN** - Machine Learning from Data
- **OPTECH** - Optimization Techniques
- **EWOC** - Entrepreneurship for World Challenges
Special measures due to COVID-19

● As of today, all academic activities (lectures, lab sessions, exams, etc) will be **face-to-face**, with sanitary measures: social distance at the classroom, masks.

● Plan B: if required by authorities, courses will immediately switch to full on-line modality

● For more details, see the COVID portals at UPC and EETAC websites

https://eetac.upc.edu/en/study/covid-19-portal-eetac

THE UPC, PROTECTED. Everyone is committed.
Enrolment

- Enrolment takes place once per semester, on **February** and **July**
  - First enrolment (today) is face-to-face, but the next ones can be done remotely via e-secretaria.

- Changes after enrolment are possible, but
  - Must be officially requested at Oficina Oberta / e-Secretaria and be approved by the Academic Coordinator
  - There are deadlines, and any request after them can be denied and imply a cost of approx. 27 euros.
  - Courses can be dropped (before a deadline), but...IMPORTANT: if the changes result in a reduction of he number of credits enrolled, no refunds will be performed. But it is still convenient to drop courses if you think you are going to fail, due to the increasing surcharges for the 2nd, 3rd and 4th attempts [https://www.upc.edu/en/masters/fees-grants](https://www.upc.edu/en/masters/fees-grants)
Qualification

- 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 for the same amount of credits with distinction
Academic Performance

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

• 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 (justified) one-time exception to the rule
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/carlosabellán](https://www.linkedin.com/in/carlosabellán)

**Twitter:** @cabellan
Master Thesis

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

- Can be done at:
  - EETAC (or ETSETB) 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 and ETSETB websites
  https://mitra.upc.es/SIA/PFC_PUBLICA.LLISTAT_OFERTS?w_codi_programa=1142

- Repository of MASTEAM and MATT theses from previous years
  https://upcommons.upc.edu/handle/2117/89303?locale-attribute=en
  https://upcommons.upc.edu/handle/2117/192882
Internships

- You can do internships at companies (provided they have an agreement with EETAC), but you cannot waive course credits
  - The tasks must be related to the master topics
- Maximum of 600h during the whole program
  - If you plan to do your Master Thesis in a company, please note that it consumes 360 hours – you should consume up to $600-360 = 240$ hours as internships while you do your courses
- Salary
  - Typically 10 euros/hour, but there can be exceptions
  - Spanish citizens will suffer a tax retention of approx. 2%.
  - Foreign citizens can suffer a much higher retention (20-25%) depending on their legal status and taxation regime
- MASTEAM internships are managed by EETAC: [https://eetac.upc.edu/en/study/internships](https://eetac.upc.edu/en/study/internships)
- MATT internships are managed by ETSETB: [https://telecos.upc.edu/en/industry-relations/convenis-de-cooperacio-educativa/informacio-per-a-estudiants](https://telecos.upc.edu/en/industry-relations/convenis-de-cooperacio-educativa/informacio-per-a-estudiants)
Internships

- When?
  - After having passed at least 15 ECTS credits
  - Advice: wait until the second semester or after 30 ECTS
  - IMPORTANT: during the semester you do the internship, you MUST enroll at least 15 ECTS credits (or enroll the last 12 ECTS of the Master Thesis)

- Your academic tutor must review and approve the work plan, considering your workload, academic records, and tasks involved

- 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

- Check more details at https://eetac.upc.edu/en/study/internships
Collaboration and research grants

- UPC departments and administrative services periodically offer collaboration.

- Typical collaboration grants topics: information desks, library, support during enrolment periods, technical support at laboratories, etc. Almost never teaching activities.

- Typical research grants topics: collaboration in research projects as laboratory technician.

- When?
  - In principle there are no requirements, but it is strongly advised not to be involved until having passed 15 ECTS.
  - IMPORTANT: offers almost always assume fluency in Catalan and/or Spanish, but some offers (mainly related to research or information desks for foreign students) are open to English-only speakers.

- Check the MASTREAM-MATT Atenea course for links to the offers.
Mobility and Double Degrees - MATT

- All procedures are managed by ETSETB - check website: https://telecos.upc.edu/en/international/studying-abroad?set_language=en

Mobility and Double Degrees - MASTEAM

- Master Thesis in more than 30 partner institutions in Europe
  https://eetac.upc.edu/en/mobility
- You can also do the Master Thesis at a company abroad
  https://eetac.upc.edu/en/study/internships/internships-abroad
- Double Degree agreements: 1 year MASTEAM + 1 year abroad = 2 master degrees
Double Degrees – MASTEAM

● Double Degree agreements
  ■ 1 year MASTEAM + 1 year abroad = 2 master degrees
  ■ Aalto University (School of Electrical Engineering), Finland: Master’s Programme in Computer, Communication and Information Sciences - Communications Engineering tracks. More details here.
  ■ Università dell'Aquila (UNIVAQ), Italy: Master in Telecommunications Engineering. More details here.
  ■ Cranfield University (UK):
  ■ Negotiations ongoing with Politecnico di Torino (Italy) and other potential partners
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
- MASTREAM and MATT are official Master degrees 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
Why take a doctoral degree at the UPC

**Because of Excellence**

The UPC is listed in the main international rankings as one of the top technological and research universities in southern Europe and is among the world’s 40 best young universities.

**Its main asset: people**

Satisfaction with the work of the thesis supervisor is highlighted by 7 out of 10 UPC doctoral students. Support and availability get the best ratings.

**Internationalisation**

More than half of the students of the UPC’s Doctoral School are international and a third obtain the International Doctorate mention.
UPC PhD programs related to ICTs

Programmes by area

- Architecture, Urbanism and Construction
- Sciences
- Civil and Environmental Engineering
- Information and Communications Technologies Engineering
  - Artificial Intelligence
  - Bioinformatics
  - Computer Architecture
  - Computing
  - Electronic Engineering
  - Erasmus Mundus in Information Technologies for Business Intelligence (IT4BI – DC)
  - Network Engineering
  - Signal Theory and Communications
Ethics

- 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
  - Academic Regulations for Bachelor and Master’s Degrees at the UPC
    Section 3.1.2. Students’ rights and obligations during the assessment process
    (…) Irregular actions potentially leading to a significant variation of the marks obtained by one or more students will be considered a breach of the assessment regulations. Such behaviour will result in a descriptive mark of “Fail” and a numerical mark of 0 for the examination in question and the subject, without prejudice to any disciplinary proceedings that may result from that behaviour (…)

Ethics

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    Section 3.1.2. Students’ rights and obligations during the assessment process
    (…) The total or partial reproduction of academic and research works, or their use for any other purpose, must have the express permission of the author or authors of the works (…)

Work load & Competences

- As a UPC master student, **we expect you to**
  - **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](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](mailto: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
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 pass T-usual (unlimited trips for 30 or 90 days) is the best and cheaper 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
    • @avisosrodalies (personalized warnings)
    • @TMB_barcelona, @TMBinfo
EETAC information systems

- **ATENEA** [https://atenea.upc.edu/](https://atenea.upc.edu/)
  - An intranet for each course, with materials, assignments, etc
  - Generic courses: EETAC (Catalan), MASTREAM (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
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 minor modification).
- **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.
Institutional e-mail address & Gsuite

● Gmail-based institutional account with format: 
  name.surname(s)@estudiantat.upc.edu

- IMPORTANT!! You will receive there all the institutional messages from the School and the professors, and course notifications – **check it at least twice per day**

- Please check instructions on how to access and configure your e-mail address here (automatic translation):

- You also have access to the Gsuite apps: calendar, Google Drive, Meet, Chat, etc.
Wi-fi access, software and licenses

- EDUroam is the global Wi-Fi network for universities & research centers
  
  ![EDUroam](https://www.eduroam.org/)

  You can access it with your UPC credentials. Instructions:
  
  [https://serveistic.upc.edu/ca/wifiupc/documentacio/eduroam-configuration-guide](https://serveistic.upc.edu/ca/wifiupc/documentacio/eduroam-configuration-guide)

- UPC has a software distribution service and also provides some student license agreements
  
  [https://distribuciosoftware.upc.edu](https://distribuciosoftware.upc.edu)
  
Access to research databases

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

http://bibliotecnia.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 uploaded a digital picture to e-secretaria and https://identitatdigital.upc.edu/myid
  ■ Set up an appointment from September 27th to October 8th at https://mycitaprevia.upc.edu/carnetupc/
  ■ More information at 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!
Student’s Unions

- Representatives of the students in front of the Schools

- **EETAC:**
  - Delegació d’Alumnes del Campus del Baix Llobregat
  - [https://dabl.eetac.upc.edu/](https://dabl.eetac.upc.edu/)

- **ETSETB:**
  - Delegació d’Alumnes de Telecomunicacions
  - [https://dat.upc.edu/](https://dat.upc.edu/)
Forum

- Business forum organized for and by EETAC students
  - Conferences and presentations by companies
  - Recruitment actions
  - Get involved!! more info at the DABL Student Union
  - Takes places in Spring. Link to the 2021 edition
    https://forumaeerotelecom.upc.edu/
Work hard, play harder

- **Castelldefesta**
  - The Campus Festival  [https://www.youtube.com/watch?v=mH0nj5](https://www.youtube.com/watch?v=mH0nj5)
  - Spring 2022: To be confirmed

- **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
    - Main festivities
      - Mercè (Barcelona), September 24th
      - Santa Eulàlia (Barcelona), February 12th
      - Sant Jordi, April 23rd
      - Sant Joan, June 24th
    - **Castells**  [https://www.facebook.com/GRILLATSCBL/](https://www.facebook.com/GRILLATSCBL/)
UPCArts program
Sports

- UPC Sports Service [http://www.upc.edu/esports](http://www.upc.edu/esports)

- Gym at the Castelldefels Olympic Canal
Work hard, play harder

Gym

Campus

www.bcncatfilmcommission.com
Meet Barcelona
A space for everyone keen to discover Barcelona

Santa Eulàlia Festivities
The festivities dedicated to Santa Eulàlia, the city's co-patron saint, take place from 11 to 14 February, offering a programme to suit everyone.

http://meet.barcelona.cat/en/
Interesting links

- **UPC Welcome guide**

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

- **5G Barcelona initiative**
  - CTTC - 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/](http://www.barcinno.com/barcelona-5g-open-lab/)
QUESTIONS ?