

## 230353 - FTMC - Future Trends in Mobile Communications

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|--------------------|---------------------------------------------------------------------------------------------|---------------------|---------|
| Coordinating unit: | 230 - ETSETB - Barcelona School of Telecommunications Engineering                           |                     |         |
| Teaching unit:     | 739 - TSC - Department of Signal Theory and Communications                                  |                     |         |
| Academic year:     | 2019                                                                                        |                     |         |
| Degree:            | MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional) |                     |         |
| ECTS credits:      | 2,5                                                                                         | Teaching languages: | English |

### Teaching staff

|              |                   |
|--------------|-------------------|
| Coordinator: | Ferran CASADEVALL |
| Others:      | Ferran CASADEVALL |

### Prior skills

Basic knowledge about radiocommunications.

### Degree competences to which the subject contributes

Specific:

CE1. Ability to apply information theory methods, adaptive modulation and channel coding, as well as advanced techniques of digital signal processing to communication and audiovisual systems.

CE2. Ability to develop radio-communication systems: antennas design, equipment and subsystems, channel modeling, link dimensioning and planning.

CE3. Ability to implement wired/wireless systems, in both fix and mobile communication environments.

CE9. Ability to deal with the convergence, interoperability and design of heterogeneous networks with local, access and core networks, as well as with service integration (telephony, data, television and interactive services).

Transversal:

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

### Teaching methodology

- Lectures
- Individual work (distance)
- Extended answer test (Final Exam)

### Learning objectives of the subject

Mobile communication systems have experienced tremendous growth in the last decades. In the near future, it is expected an explosion of data traffic, driven by the exponential increase of mobile devices as well as bandwidth consuming applications such as video streaming and mobile gaming. To fulfill such a tremendous traffic demand, new and innovative physical layer techniques, with very-high spectral efficiency (e.g. by using massive MIMO), the exploitation of new spectrum toward much higher frequencies (e.g. considering millimeter waves), or the ultra densification of wireless networks are some of the techniques proposed. The aim of this course is to present the rationality for applying these innovative techniques as well as what are the main and most relevant technical aspects behind them.

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Learning results of the subject:

- Ability to understand the technical specificities behind the innovative communication envisaged for systems beyond LTE.
- Ability to analyse, and model new architectures, network protocols and communication interfaces for systems beyond LTE.

### Study load

|                              |                    |         |        |
|------------------------------|--------------------|---------|--------|
| Total learning time: 62h 30m | Hours large group: | 20h     | 32.00% |
|                              | Self study:        | 42h 30m | 68.00% |

### Content

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| Future Trends in Mobile Commuunications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Learning time: 62h 30m<br>Theory classes: 20h<br>Self study : 42h 30m |
| <p>Description:</p> <p>Topic 1 – INTRODUCTION</p> <ul style="list-style-type: none"> <li>• FORECAST OF THE TRAFFIC EVOLUTION</li> <li>• REQUIREMENTS FOR THE NEXT GENERATION MOBILE COMMUNICATIONS</li> <li>• 5G SCENARIOS : eMMB, IoT, V2X, Industry 4.0</li> <li>• 5G TECHNOLOGY CHALLENGES</li> </ul> <p>Topic 2 – SYSTEM RELATED ISSUES</p> <ul style="list-style-type: none"> <li>• ULTRA-DENSE NETWORKS</li> <li>• C-RAN</li> <li>• SOFTWARE DEFINED NETWORKS (SDN) &amp; NETWORK VIRTUALIZATION (NV)</li> </ul> <p>Topic 3 – TECHNOLOGY ISSUES</p> <ul style="list-style-type: none"> <li>• NEW RADIO STANDARD</li> <li>• MILLIMETRIC-WAVES FOR WIRELESS COMMUNICATIONS</li> <li>• MASSIVE MIMO FOR THE NEXT GENERATION OF WIRELESS SYSTEMS</li> <li>• NEW TRENDS IN PHYSICAL LAYER ISSUES</li> </ul> |                                                                       |

### Qualification system

Continuous assessment 50% of the final mark  
Final exam 50% of final mark.



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### Bibliography

#### Others resources:

##### Basic:

- Slides of the course
- Papers and presentation published in IEEE, ITU, ETSI and other standardization bodies

##### Complementary:

- Papers published in magazines, conferences and other research bodies.