

Course guides

230161 - SSCMOB - Support Systems for Mobile Communications

Last modified: 06/05/2020

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2020 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Calveras Auge, Ana M.

Others: Calveras Auge, Ana M.
Paradells Aspas, Jose

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:

12 CPE N3. They will be able to identify, formulate and solve engineering problems in the ICC field and will know how to develop a method for analysing and solving problems that is systematic, critical and creative.

TEACHING METHODOLOGY

Application class
lectures
Group work (learning)
Individual (learning)
Evidence of long answer (Control)
Evidence of long answer (Final Exam)

LEARNING OBJECTIVES OF THE SUBJECT

The objective of this course is to train students in aspects of functionality, size and service of mobile cellular networks. First the basic concepts that enable such networks to operate. Then delve into the strategies used to perform the transfer functions of search and tracking of mobile terminals.

The second part of the course focuses on the operation of transport and access networks that make up the mobile communication networks. Explain its elements, its signs and how to dimensionate them.

Learning outcomes:

- It has capacity to build, operate and manage networks, services, processes and telecommunications applications from the point of view of telematic services.
- Is able to apply management techniques, signaling, switching, routing and routing networks in fixed and mobile environments.
- You can analyse using traffic engineering (graph theory, queuing theory and teletraffic).
- Are you familiar with the protocols and communication interfaces at different levels of network architecture and is able to describe them, program them, validate them and optimize them.
- Meet the technological progress of transmission, switching and process to improve the networks and online services.
- Plan and agreed objectives, operating rules, responsibilities, agenda and procedure for reviewing the work.
- Identifies, models and poses from open situations. Explore and apply alternatives for their resolution. Use approaches.



STUDY LOAD

Type	Hours	Percentage
Hours large group	65,0	43.33
Self study	85,0	56.67

Total learning time: 150 h

CONTENTS

Item 1. Basic functions of a mobile network.

Description:

Choosing base station, access, configuration, communication and monitoring.
Search, locate and transfer.
Performance parameters in wireless systems.
Basic services of a mobile system: based circuit-mode and packet-based mode.

Full-or-part-time: 11h 15m

Theory classes: 5h 20m

Self study : 5h 55m

Item 2. Handover analysis techniques.

Description:

Description and analysis of the technical handover of cellular mobile systems

Full-or-part-time: 11h 15m

Theory classes: 5h 20m

Self study : 5h 55m

Item 3. Paging strategies.

Description:

Search for static routes.
Looking for dynamic areas.
Evaluation of delay.

Full-or-part-time: 11h 15m

Theory classes: 5h 20m

Self study : 5h 55m

Item 4. Localization.

Description:

Localization techniques.
Combined use of location and searches.

Full-or-part-time: 10h 35m

Theory classes: 4h 40m

Self study : 5h 55m



Item 5. Access network.

Description:

Evolution.
Types of information: signaling, synchronization, control and user.
Transport systems.
Dimensioning of the network: services and services not elastic.

Full-or-part-time: 10h 35m

Theory classes: 4h 40m

Self study : 5h 55m

Item 6. Backbone.

Description:

Evolution.
Switching elements.
Elements of control: signaling network.
Elements of building services: IMS.
Interconnection networks.
Sizing of elements and interfaces.

Full-or-part-time: 10h 35m

Theory classes: 4h 40m

Self study : 5h 55m

Topic 7. 4G Systems

Description:

LTE radio interface
Physical channels
Control channels
Broadcast
Locking
Access
Paging
Capacity calculation
Network elements
Elements and topology
Roles and procedures
Resource allocation
Handover
Location update
Voice Support

Full-or-part-time: 31h 45m

Theory classes: 14h

Self study : 17h 45m



Topic9. Security

Description:

Security
Mechanisms and procedure for GSM
Security risks
Mechanisms and procedure for UMTS
Security risks
Mechanisms and procedure for LTE
Security risks

Full-or-part-time: 21h 10m

Theory classes: 9h 20m

Self study : 11h 50m

Topic 9. Evolution: 4G+ and 5G

Description:

Evolution: 4G+ and 5G
Improvements over 4G: Carrier aggregation. Support unlicensed bands,..
5G: New radio interface, network slicing,..

Full-or-part-time: 10h 35m

Theory classes: 4h 40m

Self study : 5h 55m

GRADING SYSTEM

First intermediate exam (IE_1) (50%)

Second intermediate exam (IE_2) (50%)

Final exam (FE) (100%). In case you fail the continuous evaluation

BIBLIOGRAPHY

Basic:

- Schwartz, M. Mobile wireless communications. Cambridge: Cambridge University Press, 2005. ISBN 0521843472.
- Garg, V.K.; Wilkes, J.E. Principles and applications of GSM. Upper Saddle River: Prentice Hall PTR, 1999. ISBN 9780139491245.
- Kreher, Ralf; Gaenger, Karsten. LTE signaling, troubleshooting and performance measurement [on line]. Second edition. West Sussex: John Wiley & Sons, [2016] [Consultation: 19/05/2020]. Available on: <https://onlinelibrary.wiley.com/doi/book/10.1002/9781118725092>. ISBN 9781118725092.

RESOURCES

Hyperlink:

- Atenea. Atenea

Other resources:

<https://atenea.upc.edu>