Course guide
230161 - SSCMOB - Support Systems for Mobile Communications

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: 2022 ECTS Credits: 6.0 Languages: Catalan

LECTURER

Coordinating lecturer: Consultar aquí / See here: https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura

Others: Consultar aquí / See here: https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma

REQUIREMENTS

NETWORK ANALYSIS AND EVALUATION - Precorequisite

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>85,0</td>
<td>56.67</td>
</tr>
<tr>
<td>Hours large group</td>
<td>65,0</td>
<td>43.33</td>
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</tbody>
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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

Topic 9. 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:

RESOURCES

Hyperlink:
- Atenea. Atenea

Other resources:
https://atenea.upc.edu