

30354 - Mobile Networks

Syllabus Information

Academic Year: 2020/21

Subject: 30354 - Mobile Networks

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 438 - Bachelor's Degree in Telecommunications Technology and Services Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject Type: ---

Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, tutored practical works, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials, including a discussion forum.

Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

This is a 6 ECTS course organized as follows:

- **Lectures** (57 hours). Lectures run for 4 weekly hours. The teacher explains the course contents and solves representative applied problems. These problems and exercises can be found in the problem set provided at the

beginning of the course. Regular attendance is highly recommended.

- **Two tutored practical works** (30 hours). This activity will advance all proposed learning outcomes. Follow-up sessions will be conducted by the teacher in which each student will present their work.
- **External visit** (3 hours). A visit to the company TELTRONIC.S.A.U., manufacturer of mobile communications equipment for the professional market will be held.
- **Autonomous work** (60 hours). Students are expected to spend about 60 hours to study theory, solve problems, prepare sessions, and take exams.
- **Tutorials**. Teacher's office hours allow students to solve questions and discuss unclear course contents. It is advisable to come with clear and specific questions.

4.3. Syllabus

The course will address the following topics:

Block 0. Introduction.

- *Course presentation.*
- *General concepts:* Introduction to mobile networks. Mobility implications

Block 1. Fundamentals of Mobile Communications Networks.

- *Cellular networks. General functions. Mobile network architecture: Access networks and core network.*
- *Spectrum, standardization and regulation.*
- *Effects of the radio channel and transmission systems: Propagation losses, shadowing, fast fading, Doppler shift. Environments classification. Co-channel interference, adjacent channel interference, non-linear distortion.*
- *Radio engineering techniques: Physical layer: Modulation, channel coding, interleaving, diversity, channel equalization. Duplexing* Técnicas de ingeniería radio: Nivel físico: Modulación, codificación de canal, entrelazado, diversidad, ecualización de canal. Duplexing (FDD and TDD). Multiple Access (FDMA, TDMA, CDMA, OFDMA).
- *Technologies, services and applications.*

Block 2. Mobile Network Functions.

- *Mobility Management: Location procedures, paging, handover. Radio Resource Management. Quality of Service Management.*
- *Network Architectures: Mobile network functional elements. Network topology. 2G, 3G and 4G networks. Other wireless access networks. Cellular networks (GSM, UMTS, LTE, TETRA)*

Block 3. Second Generation Mobile Networks.

- *GSM and GPRS networks:*
- *Air interface structure. Physical and logical channels definition and organization.*
- *Network functions implementation on the air interface.*

Block 4. Third Generation Mobile Networks.

- *Fundamentals of CDMA based mobile networks.*
- *Dimensioning of third-generation CDMA based mobile networks. Access and core networks.*
- *Third-generation mobile networks: UMTS, HSDPA/HSUPA:*
- *Evolution towards fourth-generation mobile networks: LTE*
 - *Air interface structure. Physical and logical channels definition and organization.*
 - *Network functions implementation on the air interface.*

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the EINA website (<http://eina.unizar.es>).

4.5. Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=30354&year=2019