

**COURSE DATA****Data Subject**

Code	43856
Name	Mobile communication networks
Cycle	Master's degree
ECTS Credits	5.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2174 - M.U. en Ingeniería de Telecomunicación 13-V.2	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
2174 - M.U. en Ingeniería de Telecomunicación 13-V.2	10 - Mobile communication networks	Obligatory

Coordination

Name	Department
SEGURA GARCIA, JAUME	240 - Computer Science

SUMMARY

In the course Mobile Communication Networks, the latest networks and services for mobile communication are presented. It focuses on two key concepts:

- 1) Architecture and signaling in mobile networks
- 2) Wireless Broadband Access Sharing technologies for mobile users

At the end of the course, the student will have acquired sufficient knowledge and skills to:

- Understand the implications of Quality of Service provisioning in mobile IP networks
- Understand which components and functionalities are necessary in a 3G/4G mobile network architecture
- Continue learning about the operation of signaling protocols based on SIP and its extensions
- Understand the operation of the protocols forming the wireless interface in mobile networks of the latest generation
- Use tools for the analysis of communication networks for the performance evaluation in terms of



packet loss and delay.

- Understand the working performance of the technologies based on MANET and the Internet of Things (IoT).

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

No previous knowledge is required apart from the official Master access requirements.

OUTCOMES

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- To have the ability of standing up for fair criteria with rigor and arguments, reporting them publicly in a clear way and in a multilingual environment.
- To have the ability to participate in diffusion forums, journals, conferences, etc. and to work cooperatively and effectively in transnational teams.
- To have the capability to identify and solve the critical points to conduct an effective technology transfer, transforming theoretical results into products and services that are useful for the society.
- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Be able to access to information tools in other areas of knowledge and use them properly.
- To be able to assess the need to complete the scientific, historical, language, informatics, literature, ethics, social and human background in general, attending conferences, courses or doing complementary activities, self-assessing the contribution of these activities towards a comprehensive development.
- Ability to model, design, implement, manage and maintain networks, services and contents.
- Ability to plan, take decisions and design networks, services and applications considering quality of service, direct costs, implantation plans, supervision, security protocols, scaling and maintenance, as well as managing and assuring the required quality in the development process.
- Ability to solve the convergence, interoperability and design of heterogeneous networks with local, access and backbone networks, as well as the integration of telephone, data, television and interactive services.



LEARNING OUTCOMES

This course allows to achieve the following learning objectives:

1. Understand the fundamentals of mobile network operation for multimedia service provisioning, both from a network architecture perspective as well as from the perspective of technologies and protocols of the wireless interface
2. Use of analytical tools for the performance evaluation of wireless networks in terms of QoS

Complementing these objectives, this course also allows for the acquisition of the following soft skills:

- Promotion of teamwork: collaboration, leadership, planning, interaction, achieving consensus, negotiation, conflict resolution and respecting different opinions
- Promotion of individual work, organizing the work itself efficiently in the form of tasks and subtasks
- Promotion of the capacity to communicate and present efficiently, in written as well as in oral form (in English).
- Promotion of the ability to start working on research tasks in academia or industry through structured problems.

DESCRIPTION OF CONTENTS

1. Wireless Access Technologies

Access Technologies in WLANs, WIMAX and LTE. Radio Resource Assignment, Medium Access Protocols and Multiple Access Communications (TDM(A), (O)FDM(A), CDM(A), Aloha, 802.11)

2. Performance of Wireless Networks in terms of QoS

Mobile & Multimedia Applications. Quality of Service.

3. Network Architecture

3G/4G Network Architecture. SIP (Signaling Internet Protocol). MANET. IoT. IP Multimedia Subsystem (IMS). P2P Networks.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	25,00	100
Tutorials	10,00	100
Laboratory practices	9,00	100
Classroom practices	6,00	100
Development of group work	6,00	0
Development of individual work	10,00	0
Study and independent work	15,00	0
Readings supplementary material	4,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	125,00	

TEACHING METHODOLOGY

1) Work at the course:

- a) MD1.-(AF1)Theory sessions, including short activities for the students.
- b) MD2.- (AF2) Problem solving sessions, to practice the concepts from the theory sessions.

2) (AF3) Student's own work:

- a) Resolution and presentation of final project. It tries to solve a final project proposed by the teacher and public exposure of this at the end of the course.
- b) Exam preparation.

3) (AF5) Consulting sessions: A certain number of hours are established each week, which the students can attend in order to solve doubts.

Aula Virtual. UV's e-learning platforms (Aula Virtual) will be used to communicate with students. They will also provide access to the material used in the lectures, such as slides, and to the homework assignments.



EVALUATION

The assessment takes into account the following items and ratings:

- SE2.- Laboratory exercises (25% of the final grade)
- SE3.- Proposed Work (25% of the final grade)
- SE1.- Final exam (50% of the final grade)

The minimum mark required to pass the course is 3.5 over 10 in the final exam. The remaining items are not subjected to a minimum.

If a student is not able to attend the classes on a regular basis (being not eligible for this evaluation model), he/she should inform the teacher at the beginning of the course.

In any case, the system of evaluation will be ruled by the established in the Regulation of Evaluation and Qualification of the University of Valencia for Degrees and Masters. (http://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf).

REFERENCES

Basic

- Camarillo-García, The 3G IP Multimedia Subsystem (IMS), 2nd. Edition, Wiley, 2005.
- D. Bertsekas, R. Gallager; Data Networks. Prentice Hall. Second Edition, 1992.
- Bianchi, G. Performance analysis of the IEEE 802.11 distributed coordination function IEEE Journal on Selected Areas in Communications, 2000.

Additional

- Alberto León-García, Indra Widjaja; "Communication networks: fundamental concepts and key architectures". McGraw-Hill, 2004