**(1) GENERAL**

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| **SCHOOL** | Engineering |
| **ACADEMIC UNIT** | Informatics and Computer Engineering |
| **LEVEL OF STUDIES** | Undergraduate |

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| **COURSE CODE** | | **SEMESTER** | 8 |

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| **COURSE TITLE** | Mobile communication networks |

| **INDEPENDENT TEACHING ACTIVITIES**<br>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits | **WEEKLY TEACHING HOURS** | **CREDITS** |
|---|---|---|
| **Lectures** | 3 | |
| **Laboratory exercises** | 1 | |
| Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d). | 4 | 5 |

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| **COURSE TYPE**<br>general background, special background, specialised general knowledge, skills development | specialised general knowledge, skills development |
| **PREREQUISITE COURSES:** | Computer Networks I, Computer Networks II, Digital Communications |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes (in English) |
| **COURSE WEBSITE (URL)** | |

**(2) LEARNING OUTCOMES**

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| **Learning outcomes**<br>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.<br>Consult Appendix A<br>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area<br>• Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B<br>• Guidelines for writing Learning Outcomes |

**The course aims to offer specialized knowledge for modern wireless and mobile communications network technologies. The lectures and the laboratory exercises aim to analyze basic and advanced concepts of wireless mobile communication systems, and to present their architecture, operational processes, applications and future trends regarding their evolution in combination with other network technologies and emerging services.**

**Upon successful completion of the course, the student will be able to:**
- **obtain a deep understanding of the mobile communication networking features compared to fixed access systems in terms of quality and time variability of the channel, but also in terms of security.**
- **understand the generation evolution of mobile and wireless networking communications.**
- **distinguish the main differences between wireless and mobile communication systems at the level of architecture, access technologies, performance and provided services.**
- **utilize basic tools for network scaling.**
- **analyze and estimate the mobile communication system performance in various**

**environments using radio coverage models.**
- **utilize basic laboratory equipment (spectrum analyzers, wireless modem) to study the performance of wireless communication systems.**
- **obtain proven knowledge and understanding of all contemporary challenges of mobile communications networks and their emerging applications so as to acquire the basis for novelty in the development and implementation of new conceptual frameworks.**

**General Competences**

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

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| Search for, analysis and synthesis of data and information, with the use of the necessary technology | Project planning and management |
| | Respect for difference and multiculturalism |
| | Respect for the natural environment |
| Adapting to new situations | Showing social, professional and ethical |
| Decision-making | responsibility and sensitivity to gender issues |
| Working independently | Criticism and self-criticism |
| Team work | Production of free, creative and inductive thinking |
| Working in an international environment | …… |
| Working in an interdisciplinary environment | Others… |
| | ……. |
| Production of new research ideas | |

- Working independently
- Teamwork
- Work in an interdisciplinary environment
- Production of new research ideas
- Production of free, creative and inductive thinking

**(3) SYLLABUS**

- Introduction to wireless and mobile communication technologies.
- Propagation in free space – propagation phenomena.
- Propagation compensation techniques (dropouts, multipath transmission, interference, noise, shadowing)
- Cell Concept Analysis. Multiple access techniques (TDMA, FDMA, CDMA, OFDMA, SDMA).
- The concept of handover, theory of telecommunication traffic in mobile communications systems. Evaluation parameter analysis and optimization algorithms with regards to the quality of offered services (QoS).
- Overview of wireless local area network (WiFi) technologies.
- Overview of 2nd generation mobile communication systems (GSM-900, GSM-1800, GPRS, EDGE).
- Overview of 3rd generation cellular communication systems (UMTS, HSPA).
- 4th and 5th generation mobile communication systems – Convergence technologies

of fixed wireless networks.
- Emerging services – vertical industries.

**(4) TEACHING and LEARNING METHODS - EVALUATION**

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| **DELIVERY**<br>Face-to-face, Distance learning, etc. | Face-to-face, Distance learning regarding virtual lab course functionality. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br><br>Use of ICT in teaching, laboratory education, communication with students | • **Specialized Design and Analysis Software of Mobile Communications Networks – use of transceiver systems simulator in MatLab.**<br>• **Learning support process through the e-learning platform of the University.** |

| **TEACHING METHODS**<br>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.<br><br>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS | |
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| Activity | Semester workload |
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| Lectures | **39** |
| Practices exercises | **13** |
| Laboratory exercises | **25** |
| Independent Study | **48** |
| Course total | **125** |

| **STUDENT PERFORMANCE EVALUATION**<br>Description of the evaluation procedure<br><br>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other<br><br>Specifically-defined evaluation criteria are given, and if and where they are accessible to students. | I. Hand-written final exam (50%) which includes:<br>- Short answer questions<br>- Problem solving<br>II. Elaboration of laboratory exercises and final lab exam (25%)<br>III. Assessment of individual and team coursework (25%). |
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**(5) ATTACHED BIBLIOGRAPHY**

**(1)** M. Theologou (2007): "Mobile and personal communication networks", Tziola publications.

**(2)** A. Kanatas, F. Konstantinou and G. Pantos (2008): Mobile communication systems, Papasotiriou publications.

**(3)** X. Vasilopoulos, D. Kotoulas, D. Xenikos, P. Vouddas, G. Heliotis, G. Agapiou, T. Doukoglou: Next generation networks, Klidarithmos publications, (2010).