COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	INFORMATICS AND COMPUTER ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE		**SEMESTER**	**8th**
COURSE TITLE	WIRELESS SENSOR NETWORKS		

INDEPENDENT TEACHING ACTIVITIES 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	2	
Tutorials	1	
Labs	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	4	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialized general knowledge, Skills Development
PREREQUISITE COURSES:	Computer Networks I & II
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	ENGLISH (Instruction, Examination)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in ENGLISH)
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

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.

Consult Appendix A

- Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area
- Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B
- Guidelines for writing Learning Outcomes

The course aims to provide a deeper understanding of the basic concepts and technologies related to the development of Wireless Sensor Networks (WSN). The course analyzes topics related to connectivity, topology control, area coverage, communication protocols, energy-efficient data collection, and processing techniques in WSN applications.

After the successful completion of the course, the student will know:

• The basic issues that differentiate the WSNs from the legacy networks and the appropriate methodologies of analysis, design, and operation of applications in a wireless sensor network environment.

• Hardware and software technologies for wireless sensor networks.

• The communication, routing, and data collection protocols in wireless sensor networks

• Operating systems and middleware level requirements for wireless sensor

networks.
• Security requirements in wireless sensor networks.
• The techniques and tools for the implementation of wireless sensor networks and the development of innovative applications.

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?

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 responsibility and sensitivity to gender issues
Decision-making	
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	

• Adapting to new situations
• Retrieve, analyze and synthesize data and information, with the use of necessary technologies
• Working independently
• Teamwork
• Work in an interdisciplinary environment
• Produce new research ideas
• Promote free, creative and inductive thinking

(3) SYLLABUS

• Applications in Wireless Sensor Networks
• Technologies applied in wireless sensor nodes. Design and network topologies in WSN. Self-awareness mechanisms and communication protocols.
• Link layer communication protocols.
• Network layer communication protocols, energy efficient routing.
• Service discovery mechanisms, localization protocols, and large area covering.
• Operating systems and middleware in WSNs
• Design principles for energy efficient implementations
• Security and data privacy issues
• Tools and IDEs for software development
• Simulation end emulation tools

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICT in Course Teaching • Use of the Open eClass system, with uploaded notes, lectures, exercises for practice and communication with students • Practical exercises based on WSN equipment.
TEACHING METHODS 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. 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	**Activity** / **Semester workload** Lectures: 26 Tutorials: 13 Labs: 13 Project: 20 Independent Study: 53 **Total: 125**
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure 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 Specifically defined evaluation criteria are given, and if and where they are accessible to students.	**I.** Written exams (accounts 70% of the total course mark) which consist of: - Short answer questions - Multiple choice questions - Real-life problems resolution **II.** Lab Projects (accounts 30% of the total course mark) The evaluation process is disclosed to the students in class and online, via e-class.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Wireless Sensor Networks: Principles, Design and Applications, Yang, Shuang-Hua, Springer, 2014.
2. Wireless Sensor Networks: Security, Coverage, and Localization, Rastko R. Selmic, Vir V. Phoha Abdul Serwadda, Springer, 2016.
3. Wireless Sensor Networks: Concepts, Applications, Experimentation and Analysis,

Fahmy, Hossam, Mahmoud Ahmad, Springer, 2016.
4. Fundamentals of Wireless Sensor Networks: Theory and Practice, Waltenegus Dargie and Christian Poellabauer, Wiley, 2010.
5. Wireless Sensor Networks, Ian F. Akyildiz, Mehmet Can Vuran, Wiley, 2010.
6. Clustering and Routing Algorithms for Wireless Sensor Networks: Energy Efficiency
7. Approaches, Pratyay Kuila, Prasanta K Jana, CRC - Taylor & Francis, 2016.
8. Wireless Sensor Networks: From Theory to Applications, Ibrahiem M. M. El Emary, S. Ramakrishnan, CRC - Taylor & Francis, 2013.
9. The Art of Wireless Sensor Networks, Volume 1: Fundamentals, Ammari, Habib M., Springer, 2013.
10. RFID and Sensor Networks: Architectures, Protocols, Security, and Integrations, Yan Zhang, Laurence T. Yang, Jiming Chen, CRC - Taylor & Francis, 2009.
11. TinyOS Programming, Philip Levis and David Gay, Cambridge University Press, 1st edition, April 2009.
12. Castalia: WSNs and BANs simulator. 2007. National ICT Australia. URL: http://castalia.npc.nicta.com.au/
13. Contiki 'Cooja': a network simulator designed for Wireless Sensor Networks. 2003. http://anrg.usc.edu/contiki/index.php/Cooja_Simulator.

- Relevant Scientific Journals:

1. Transactions on Sensor Networks, ACM
2. International Journal of Sensor Networks, Inderscience Publishers
3. Eurasip Journal on Wireless Communications and Networking, Springer
4. Wireless Networks Journal, Springer
5. Ad hoc Networks, Elsevier
6. Sensors Journal, IEEE