ΞΣΕ881-DIGITAL TECHNOLOGIES AND INTELLIGENT SYSTEMS

1. GENERAL

SCHOOL	School of Technology		
DEPARTMENT	Department of Forestry, Wood Sciences, and Design		
LEVEL	*Undergraduate*		
CODE	**ΞΣΕ881**	**STUDENT SEMESTER**	8th
COURSE TITLE	Digital Technologies and Intelligent Systems		

ACTIVITIES	**WEEKLY HRS**	**ECTS**
Lectures and Workshops	3	4

TYPE OF COURSE	Scientific area
PREREQUISITES:	None
LANGUAGE TEACHING AND EXAMINATION:	Greek
THE COURSE OFFERED TO STUDENTS ERASMUS	No
WEBPAGES COURSE (URL)	https://eclass.uth.gr/courses/FWSD_U_151/

2. LEARNING OUTCOMES

Learning Outcomes

The aim of the course is to provide basic knowledge concerning intelligent systems and digital technologies and their applications in areas such as Environment, Wood and Furniture.

At the end of the course students will be able to:

- Know the basic concepts of Digital Technologies and Intelligent Systems
- Have an understanding the potential of Artificial Intelligence and its applications in the Environment/Wood/Furniture
- Understand when a development of a system based on AI is feasible and/or recommended.
- Use common AI software to configure an intelligent system
- Organise data in simple files or in data bases so that to be accessible by SQL commands and other software
- Have basic knowledge of SQL so that to process and analyse data stored in a database.
- Have basic knowledge of Expert Systems and Neural Networks
- Combine results of common data analysis algorithms, such as classification, clustering, and association rule mining to draw conclusions
- Have basic knowledge of microcontroller programming, such as using Python language
- Create basic microcontroller intelligent applications

General Skills

Upon successful completion of the course, the students will be able to develop and cultivate basic professional and social skills:

- Search, analysis and synthesis of data and information, using the necessary technologies
- Adaptation to new situations
- Decision making
- Autonomous work
- Teamwork
- Demonstration of social, professional and moral responsibility and sensitivity to gender issues
- Exercise criticism and self-criticism
- Promoting free, creative and inductive thinking

3. COURSE CONTENT

In the theoretic part the following topics are described:

Introduction to Digital Technologies. Artificial Intelligence, Intelligent processes and Intelligent Systems. Introduction to Internet of Things. Intelligent Process Development Technologies. Introduction to data bases and expert systems (system architecture and processing, knowledge representation and engineering). Basic data warehouse concepts. Data transformation and preprocessing. Data analysis using SQL. Basic Big Data concepts. Data mining and Machine Learning. Introduction to Neural Networks (Neural models, training, evaluation, applications). Use of software tools to develop Neural Networks.Basic concepts of sensors, embedded systems and microcontrollers. Arduino and Raspberry Pi microcontrollers. Basic concepts of microcontroller programming using Python. Case studies of intelligent automation applications in furniture and interior spaces.

Students develop final semester assignments in groups. Course lectures and other activities are supported by workshops, where each student team is discussing their work and seeking solutions to any problems it faces or specialized knowledge about specific aspects of its work.

The final semester assignment requires submission of the assignment materials as well as a 10 minute oral presentation at week 12. The semester assignment counts for 20% of the total course assessment and the remaining 80% is obtained through written examination.

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY METHOD	Face to face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of a course website on the e-class platform for posting (a) notes, (b) internet links, (c) announcements, search tools and social networks Furthermore, use of equipment such as video projector, interactive board, and use of server and terminal stations at the laboratory room.
TEACHING ORGANISATION	
STUDENT EVALUATION	Both intermediate and final evaluation is applied.

Activity	***Semester Workload***
Interactive Teaching – Lectures	26
Studio workshops	22
Semester assignments	27
Self-study	25
Course Total	**100**

	The evaluation of the theoretical part is carried out by: 1. Optional intermediate written examination 2. Semester assignment 3. Final written exam

5. RECOMMENDED-BIBLIOGRAPHY

- Recommended literature:

- Alippi, C. (2014). Intelligence for Embedded Systems: A Methodological Approach, Springer Int'l Publishing.
- Russell, S., & Norvig, P. (1995). Artificial Intelligence: A modern approach. Prentice-Hall International.
- Jamshidi, M. and H. R. Parsaei (1995). Design and Implementation of Intelligent Manufacturing Systems: From Expert Systems, Neural Networks, to Fuzzy Logic, Prentice Hall.
- Βερύκιος, Β. (2014). Μαθήματα Βάσεων Δεδομένων. κωδ. Εύδοξου 33094772, Θεσσαλονίκη, Εκδόσεις Τζιόλα. (in Greek)
- Πογαρίδης, Δ. (2015). Ενσωματωμένα συστήματα, οι μικροελεγκτές AVR και ARDUINO, Εκδόσεις Δίσιγμα. (in Greek)
- Bell, C. (2017). MicroPython for the Internet of Things: A Beginner's Guide to Programming with Python on Microcontrollers, Apress.

- Relevant scientific journals:

- Communications of the ACM
- IEEE Computer
- IEEE Transactions on Industrial Informatics