COURSE OUTLINE

1. GENERAL

SCHOOL	APPLIED ECONOMIC AND SOCIAL SCIENCES		
ACADEMIC UNIT	AGRIBUSINESS AND SUPPLY CHAIN MANAGEMENT		
LEVEL OF STUDIES	*Undergraduate*		
COURSE CODE	**5920**	**SEMESTER**	9th
COURSE TITLE	AUTOMATION IN SUPPLY CHAIN AND AGRICULTURE		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	5
Laboratory exercises	2	

COURSE TYPE	Background
PREREQUISITE COURSES	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek
IS THE COURSE OFFERED for ERASMUS STUDENTS?	YES (in English or French)
COURSE WEBSITE (URL)	https://oeclass.aua.gr/eclass/

2. LEARNING OUTCOMES

Learning Outcomes

The purpose of the course is to provide students with a comprehensive introduction to basic STEM principles and technologies, programming, robotics, automation, embedded systems and the Internet of Things (IoT), with an emphasis on their applications in agriculture and the supply chain.

The course aims to:

1. STEM Principles: To deepen the fundamental understanding of science, technology, engineering and mathematics, and to highlight how these concepts can be applied to solve problems in agriculture and the supply chain.
2. Programming: To equip students with knowledge in programming languages such as C++ and Python, enabling them to write code, design algorithms and use modern software tools for automated applications.
3. Robotics and Automation: To develop skills in understanding basic principles of robotics and automation technologies, enabling the utilization of these technologies in practical applications.
4. Embedded Systems and IoT: To provide knowledge in the principles of embedded systems and IoT, and to examine how these technologies enhance agriculture and the supply chain.
5. Problem Solving and Critical Thinking: To enhance problem-solving and critical thinking skills, enabling students to address complex challenges in a creative and innovative way.

Upon successful completion of the course, students will be able to:

- Explain basic STEM principles and describe their applications to solve problems in agriculture and the supply chain.
- Use software tools to develop code and algorithms that are applied to automated systems.
- Understand the principles of robotics and automation technologies.

- Analyze the basic principles of embedded systems and IoT, and describe their basic building blocks.
- Develop problem-solving and critical thinking skills to address challenges related to agriculture and the supply chain.
- The course is a combination of theory and practice, offering students opportunities to apply their knowledge to realistic scenarios and projects.

General Competences

- Adapting to new situations
- Decision-making
- Working independently

3. SYLLABUS

The theoretical part of the course covers the following topics:

1. Introduction to STEM - Basic concepts in Science, Technology, Engineering and Mathematics.
2. Introduction to Programming - Programming Basics (Python or C++) I
3. Introduction to Programming - Programming Basics (Python or C++) II
4. Introduction to Programming - Programming Basics (Python or C++) III
5. Introduction to Programming - Problem-solving techniques and algorithms.
6. Introduction to Robotics - Robotics Basics, Components and Systems.
7. Introduction to Robotics - Introduction to Sensors, Actuators and Control Systems.
8. Electronics - Basic Electronics, Circuit Design and Microcontrollers I
9. Electronics - Basic Electronics, Circuit Design and Microcontrollers II
10. Embedded Systems Design and Internet of Things (IoT) I
11. Embedded Systems Design and Internet of Things (IoT) II
12. Practical Applications of Automation in Agriculture.
13. Practical Applications **of Automation in the Supply Chain.**

The laboratory part of the course covers the following topics:

- Practical laboratory sessions for building and testing Arduino-based projects. Design, implementation and testing of a prototype system.
- Software tools: Python, Arduino IDE
- Group work integrating concepts of robotics, agriculture and logistics.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY</td><td>Face -to-face</td></tr>
<tr><td>USE OF INFORMATION and COMMUNICATIONS TECHNOLOGY</td><td>

Support of the learning process through the University's AUA Open eClass platform (integrated e-Course Management System)
Support of lectures using presentation software
Use of audiovisual material
Use of web applications

Communication with students: face-to-face at office hours, email, eclass platform
</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Workload</th></tr>
<tr><td>Lectures (direct)</td><td>39</td></tr>
<tr><td>Laboratory Practice</td><td>26</td></tr>
<tr><td>Essay Writing</td><td>0</td></tr>
<tr><td>Autonomous study</td><td>36</td></tr>
<tr><td>Advisory Support</td><td>0,5</td></tr>
<tr><td>Examination</td><td>2</td></tr>
<tr><td>Laboratory Examination</td><td>2</td></tr>
<tr><td>Total
(About 25 hours of study per ECTS)</td><td>105,5</td></tr>
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</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION</td><td>
The evaluation process is carried out in the language in which the course is offered (Greek or English) and consists of:

Mandatory written final examination at the end of the semester (weighting factor of at least 70%), which includes a Multiple Choice Test and/or Essay Development Questions and/or Problem Solving. Evaluation criteria: correctness, completeness, clarity
Optional written mid-term examination or written assignment (weighting factor of 30%). Evaluation criteria: correctness, completeness, clarity

The exam material is listed on the course website.
Special learning difficulties:
Students with special learning difficulties in writing and reading (as they are certified and characterized by a competent body) are examined based on the procedure provided by the Department.
Specifically-Defined Criteria:
The evaluation criteria are made known during the first lesson and are clearly stated on the course website and the AUA Open e-class platform. The students are allowed to see their exam paper after its grading (during the announced office hours) and receive explanations about the grade they received.
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1. ATTACHED BIBLIOGRAPHY

Bibliography (in Greek):

- Καλοβρέκτης Κωνσταντίνος, Ξενάκης Απόστολος, Ψυχάρης Σαράντος, Σταμούλης Γεώργιος, Εκπαιδευτική Τεχνολογία, Αναπτυξιακές Πλατφόρμες Ρομποτικής και IoT, Έκδοση: 1η/2020, ISBN: 9789604188284, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.
- Κανδρής Διονύσης, Βελώνη Αναστασία, Βιομηχανική Πληροφορική και Αυτοματισμός, Έκδοση: 1η/2023, ISBN: 9786182210376, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.Φουντάς, Σ., & Γέμτος, Θ. (2015). *Γεωργία ακριβείας* [Προπτυχιακό εγχειρίδιο]. Κάλλιπος, Ανοικτές Ακαδημαϊκές Εκδόσεις. https://dx.doi.org/10.57713/kallipos-756
- Παπάζογλου Παναγιώτης, Λιωνής Σπύρος-Πολυχρόνης, Ανάπτυξη Εφαρμογών με το Arduino, 3η Έκδοση, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2021
- Αγγελική Μπελεχάκη, «Εκπαιδευτική Ρομποτική με Arduino», Ψηφιακή έκδοση, https://www.openbook.gr/ekpaideytiki-rompotiki-me-arduino/ , 2021.
- ARDUINO: ΑΛΓΟΡΙΘΜΙΚΗ, ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ ΚΑΙ ΕΦΑΡΜΟΓΕΣ, ΑΡΙΣΤΕΙΔΗΣ Σ. ΜΠΟΥΡΑΣ, ΓΙΑΝΝΗΣ Θ. ΚΑΠΠΟΣ, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, 2021
- Κανδρής Διονύσιος, Βελώνη Αν.ΒΙΟΜΗΧΑΝΙΚΗ ΠΛΗΡΟΦΟΡΙΚΗ ΚΑΙ ΑΥΤΟΜΑΤΙΣΜΟΣ, Εκδόσεις Τζιόλα, 2023
- Α. Μπασάρας Logistics Management & Engineering, ΕΚΔΟΣΕΙΣ ΣΤΑΜΟΥΛΗ**, 2012**
- Ρ. Ε. Κινγκ, Ευφυής έλεγχος, Εκδόσεις Τζιόλα, 2004
- Γ. Κρανάς, Ε. Δασκαλόπουλος, Βιομηχανικοί Αυτοματισμοί, Εκδόσεις Ίων, 2005
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- D. Norris, The Internet of Things: Do-It-Yourself Projects with Arduino, Raspberry Pi and BeagleBone Black, McGraw-Hill Education, 2015

Related Journals:

- International Journal of Logistics Research and Applications
- International Journal of Computer Technology and Applications (IJCTA)
- Journal of Systems and Software
- IEEE Internet of Things Journal (IoTJ)
- International Journal of Robotics Research (IJRR)
- Computers in Industry (Elsevier)
- Journal of Computer Science and Technology (JCST)