Course title	**Smart gardening technology and irrigation systems**				
Course code	**GALA2401**				
Course type	**Lectures and practical application**				
Level	Higher Diploma				
Year / Semester	2nd Year / 4th Semester				
Teacher's name	Antonia Stelikou				
ECTS	6	**Lectures / week**	1	**Laboratories / week**	2
Course purpose and objectives	The goal of the course is to equip the students with the necessary knowledge and skills for the application of modern technologies in gardening and water resource management. The course focuses on the introduction of smart gardening technology that optimise irrigation, reduce water consumption, and promote sustainability, while ensuring the health and productivity of plants. Through the study of contemporary technologies and practical applications, the students will learn to select appropriate equipment and integrate automated irrigation systems into comprehensive garden and landscape designs, thereby enhancing their ability to implement effective and sustainable horticultural projects.				
Learning outcomes	Upon the completion of the course, the students will be able to: **Theoretical Learning Outcomes:** 1. **Identify** the reasons for using Smart Gardening Technology (SGT)and recognise the advantages of each type. 2. **Describe** the construction and operation of various SGT. 3. **Explain** the fundamental principles of smart gardening technologies and irrigation systems used for monitoring and managing production. 4. **Recommend** the selection of an SGT for a specific case, considering cost factors. **Practical Learning Outcomes:** 5. **Design** and **construct** a small-scale SGT. 6. **Develop** SGT designs for both flat and uneven surfaces. 7. **Administer** necessary chemicals and fertilizers through the SGT.				
Prerequisites		**Required**			
Course content	**Week 1: Introduction to Smart gardening Technology** **Lectures** • Types of Smart Gardening Technology: Description and Functionality • Components of Irrigation Systems • Criteria for Selecting an Irrigation System • Definition and Importance of Smart Gardening Technology • Technologies Used in Gardening				

- Advantages and Challenges

Week 2:

Lectures

- Characteristics and Advantages/Disadvantages of SGTs
- Design of Irrigation Networks
    - Drip Irrigation
    - Advantages over Other Methods
    - Disadvantages of Drip Irrigation compared to Other Methods

Sensors and Measurements in Gardening technologies

- Types of Sensors (soil, moisture, temperature, etc.)
- Data Collected by Sensors
- Interpretation of Data

Week 3:

Lectures

- Information and Communication Technologies (ICT)
- Role of ICT in Gardening
- Data Management Systems and Analysis Software
- Internet of Things (IoT) in Gardening

Week 4: Irrigation with Saline Water

Lectures

- Salinity Problems
- Effect of Salinity on Plants
- Management of Salinity Problems

Field Exercises (P): Design and Installation of an Irrigation Network

Week 5-6:

Lectures

- Irrigation Methods for gardens, parks, turf grass athletic fields, golf courses
- Irrigation on Flat and Uneven Surfaces

Field Exercises (P): Design and Installation of Irrigation Network

Week 7-8:

Lectures

- Scheduling Irrigation

	• Application of Chemicals and Fertilizers via SGT **Field Exercises (P): Design and Installation of Irrigation Network** **Week 9:** Lectures • Ecological Impacts of Irrigation Methods • Overextraction of Groundwater • Methods of Estimating Water Needs (e.g. soil-based methods, climate-based methods, Evapotranspiration, plant-based methods, integrated approaches) Week 10: Lectures • Water Management in Gardening • Water Balance • Status of Groundwater • Water Sources for Irrigation Field Exercises (P): practice methods for estimating water needs (soil, climate, plant-based). Field observations of water management strategies. **Week 11-12:** **Lectures** • Water Conservation Techniques • Use of Recycled Water in Gardening • Artificial Rain • Subsurface Irrigation • Water Management Strategies • Analysis of Plant Water Needs • Adjustment of Irrigation Based on Climatic Conditions
Teaching methodology	**Theoretical Instruction** The theoretical component is delivered through structured lectures focused on the principles, technologies, and management strategies related to smart gardening technologies and irrigation systems. Emphasis is placed on understanding irrigation system design, sensor applications, data interpretation, water management, and ecological impacts, providing students with a solid technical and scientific foundation. **Practical Instruction**

	The practical component involves field exercises where students apply theoretical knowledge by designing and installing irrigation networks. Through hands-on activities, students gain experience in system setup, network planning, and operational techniques, reinforcing their skills in smart irrigation practices and water management strategies under real-world conditions.
Bibliography	**Greek Bibliography** • Πουλοβασίλης, Α. (2010). *Εισαγωγή στις αρδεύσεις*. Έμβρυο. ISBN 978- 960-8002-54-8. • Μπαμπίλης, Δ. (2004). *Αρδευτικά δίκτυα πρασίνου: Εγχειρίδιο αυτο- εκπαίδευσης και τεχνικής εφαρμογής της διαχείρισης νερού σε έργα αρχιτεκτονικής τοπίου*. Σταμούλη Α.Ε.. ISBN: 978-960-351-481-7 • Γέμτος, Θ., και Καβαλάρης, Χ. (2015). *Μηχανήματα καλλιεργητικών φροντίδων*. **Kalli** • **pos Open Academic Editions**. Ανακτήθηκε από: http://hdl.handle.net/11419/1325. ISBN978-960-603-436-7 **English Bibliography** • Laycock, A. (2011). *Irrigation Systems: Design, Planning and Construction*, CABI. ISBN 978-1845938741. • Laffan, J. (2016). *Irrigation, Centre Pivot and Lateral Move*. Tocal College, NSW DPI. ISBN:9781742569192. EBSCOHost. • **https://www.gira.com/en/en/g-pulse-magazine/smart-living/smart-garden#** • **https://www.gleebirmingham.com/news-and-views/smart-gardens-technologys-impact-modern-gardener**
Assessment	• Attendance and course participation: 10% • Individual Written Assignment. 20% • Intermediary Written Examination: 20% • Final Practical Examination: 50%
	The final practical examination will assess students' ability to apply the concepts and skills developed throughout the course. It will involve the planning, design, and basic implementation of an irrigation network, along with demonstrating an understanding of smart gardening technologies and water management practices in a practical context. Students will be evaluated on their technical execution, problem-solving approach, and overall integration of theoretical and field knowledge. The duration of the final practical examination is three academic periods and accounts for the 50% of the final grade. The theoretical component of the course is assessed through intermediary written examination and individual written assignment. The intermediary written examination include closed-ended questions (e.g., multiple-choice, matching, true/false) and open-ended questions (e.g., short-answer, essay-type, case studies). The intermediary written examination accounts for the 20% of the overall course grade and its duration is one academic period. Individual written assessment, evaluates the students on a summative level on issues related to the theoretical component of the course Student performance is evaluated on a scale of 0 to 100, with a minimum overall passing grade of 60. The final grade is calculated as a weighted average of the assessment components disclosed above.
Language	Greek or English