Course name: Automatic irrigation systems for green areas

ECTS	*3.0*
Course status	*facultative*
Course final assessment /evaluation of outcomes	*graded credit*
Prerequisite	*Basics of soil science, technical drawing and engineering graphics*

Main field of study: Landscape Architecture

Educational profile	*General academic*
Code of studies and education level	*bachelor*
Semester of studies	*summer*
Language of instruction	*English*

Course offered by:

Name of faculty offering the course	*Faculty of Environment Engineering and Land Surveying*
Name of department offering the course	*Department of Land Reclamation and Environmental Development*
Course coordinator	*Łukasz Borek, Ph.D.*

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands:			
AIS_K1	*advisability of using irrigation on landscape architecture objects*	*AK1_W05*	*T*
AIS_K2	*modern principles of designing automatic irrigation systems*	*AK1_W04, AK1_W11*	*T*
SKILLS – student is able to:			
AIS_S1	*properly select materials and technologies enabling the correct design of irrigation systems in gardens and use analytical techniques.*	*AK1_U03*	*T*
AIS_S2	*prepare design documentation for an automatic garden irrigation system, prepare a technical description with maintenance and operation conditions.*	*AK1_U04*	*T*
SOCIAL COMPETENCIES – student is ready to:			
AIS_C1	*creative and responsible solution of unusual problems in the field of irrigation of landscape architecture objects*	*AK1_K04*	*T*

Teaching contents

Lectures:	15 hours
Topics	*The advisability of using irrigation on landscape architecture objects (weather variability, physical and water properties of soils). Basics of hydrology and hydraulics*

	(flow, static and dynamic pressure, pressure losses, pipe diameter, flow speed).
	Water needs of plants. Sources of water for irrigation (water supply, well, reservoirs, rainwater, etc.). Characteristics of irrigation types (systems) used in landscape architecture. Characteristics of the components of the automatic irrigation system (filters, valves, controllers and irrigation switches). Characteristics of sprinklers and micro-sprinklers. Drip lines and their use.
	Possibility to use the irrigation installation to fertilize the soil and plants (fertigation). Principles of installation of automatic systems
	irrigation. Maintenance and operation of irrigation systems used in landscape architecture.
	Review of technical solutions used in modern irrigation systems related to landscape architecture (preparation by students of presentations related to producers and brands of various companies offering irrigation materials). Computer programs for designing automatic irrigation systems.

Accomplished learning outcomes	*AIS_K1, AIS_K2, AIS_C1*
Means of verification, rules and criteria of assessment	Pass by grade - single-choice test, the share of the grade from passing lectures in the final grade is 50%; < 51% - insufficient (2.0), 51-60 - satisfactory (3.0), 61-70 - satisfactory plus (3.5), 71-80 - good (4.0), 81-90 - good plus (4.5), 91-100 - very good (5.0).

Classes:	15 hours
Topics	*Design of an automatic irrigation system for a home garden.*
	Introduction to exercises - discussion of the components of a technical project, identification of the plan of the irrigated area and its stages
	design. Initial irrigation assumptions. Determining the source and resources of water for irrigation.
	Determining water needs. Selection and spacing of sprinklers. Selection and location of valves, main and auxiliary lines.
	Selection and location of controllers and electrical cables.
	Designing an automatic irrigation system on plans (e.g. in AutoCAD or other programs).

Accomplished learning outcomes	*AIS_S1, AIS_S2*
Means of verification, rules and criteria of assessment	For a positive grade, the design exercise must be scored at least 3.0 (satisfactory), and the share in the final grade is 50%.

Field practicals:	… hours
Topics	
Accomplished learning outcomes	
Means of verification, rules and criteria of assessment	

References:

Basic	1. Dulcet E., Ziętara W. 2013. Techniques of establishing and maintaining green areas. Publishing House of the University of Technology and Life Sciences in Bydgoszcz, pp. 225. 2. Pływaczyk A., Kowalczyk T. 2007. Water management in the landscape. UP Wrocław, pp. 126. 3. Gadomska A., Gadomski K. 2020. Landscape architecture Part 9 Design, arrangement and care of small garden architecture elements. Publisher: Hortpress.
Supplementary	1. Rosemary A. 2012. Basics of garden design. Manual, PWRiL, pp. 319

	2. Landscape irrigation design manual (https://www.rainbird.com/sites/default/files/media/documents/2018-02/IrrigationDesignManual.pdf) 3. Landscape irrigation design standards (https://www.harvesth2o.com/adobe_files/LIDS.pdf)

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences		0.0	ECTS **
Area of academic study: T – technical sciences		3.0	ECTS**

Structure of student activity

Contact hours	35	hrs.	1.4	ECTS**
Including: lectures	15	hrs.		
classes and seminars	15	hrs.		
consultations	3	hrs.		
participation in research	0	hrs.		
obligatory field trips	0	hrs.		
participation in examination	2	hrs.		
e-learning	0	hrs.	0.0	ECTS**
student own work	40	hrs.	1.6	ECTS**

*Areas of academic study in the fields of: A – the arts; H – humanities; M – medical, sport and health sciences; N – natural sciences; P – biological sciences; R – agricultural, forestry and veterinary sciences; S – social studies; T – engineering and technology

** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25–30 hours of classes