Course name:

AGRICULTURAL AND HORTICULTURAL PRODUCTION ENGINEERING

ECTS	**4**
Course status	**specialisation, obligatory**
Course final assessement/evaluation of outcomes	**Exam / graded credit**
Prerequisites	**production technologies; thermal technique**

Main field of study:

field of study name (capital letters) PRODUCTION ENGINEERING

Profile of study	**General-academic**
The code of studies (education level)	**bachelor**
Semester of studies	**winter / summer**
Language of instruction	**English**

Course offered by:

Name of faculty offering the course	**Faculty of Production and Power Engineering**
Name of department offering the course	**Department of Bioprocess Engineering, Energetics and Automation**
Course coordinator	**Prof. Sławomir Kurpaska**

Learning outcomes of the course:

Symbol of outcome	Description of learning outcome	Reference to	
		main field of study outcomes	discipline #
KNOWLEDGE – student knows and/or understands:			
IPR_W1	issues related to technological conditions of plant production and their impact on the engineering of implemented processes	ZIP1_W13	TZ
IPR_W2	construction and operation of mechanical assemblies of machines and devices as well as technical systems used in plant production	ZIP1_W08	TZ
SKILLS – student is able to:			
IPR_U1	carry out an analysis of the impact of selected operating parameters on ensuring the requirements of the plant cultivation process, including greenhouse production	ZIP1_U01	
IPR_U2	evaluate and critically analyze the implementation of the technological process in terms of technical solutions used and propose changes	ZIP1_U05	
SOCIAL COMPETENCE- student is ready to:			

IPR_K1	continuous acquiring knowledge and training in production engineering, and the result of preparing a self-improvement project	ZIP1_K01	
IPR_K2	activities aware of the importance of the engineer's responsibility for the quality of raw materials used in the production of feed and food	ZIP1_K04	

Teaching contents:

Lectures		**20**	**hours**
Topics of the lectures	Plant production systems in covered facilities Technical solutions of systems for controlling growth factors in objects under covers The principles of selection and design mode of components of growth factor control systems in facilities under covers (processes: irrigation, heat supply, carbon dioxide dosing, lighting of plants). Technical solutions in plant protection in sheltered facilities and field horticultural production Computers controlling growth factors in objects under cover Control and measuring equipment in facilities under covers in the aspect of maintaining optimal environmental parameters (air, substrate). Possibilities of using renewable energy sources in facilities under cover.		
Accomplished learning outcomes	IPR_W1; IPR_W2; IPR_K1; IPR_K2		
Verification methods, rules and criteria of outcome assessment	*Credit in writing; for a positive grade at least 51% of the correct answers to the questions asked should be given. Participation in the final grade in the course: 75%*		

Classes		**25**	**hours**
Topics of the classes	Laboratory exercises in the field of designing components of the heating system in objects under covers Laboratory exercises in the field of estimating: fuel, water (nutrient solution), carbon dioxide in objects under cover. Laboratory exercises in the field of irrigation (fertigation) of horticultural crops Project involving the calculation of: heat loss, radiator area, selection of the boiler's heating power, determination of the heating power utilization factor, estimation of the amount of fuel. Away exercises in a real greenhouse facility		
Accomplished learning outcomes	IPR_U1; IPR_U2; IPR_K1; IPR_K2		
Verification methods, rules and criteria of outcome assessment	*Team project (2 to 3 students) project in the selection of heating devices in the greenhouse along with estimation of the amount of fuel. Participation in the final course evaluation: 25%*		

References:

Basic	*Bakker J.C., Bot G.P.A., Challa H., Van de Braak N.J.: Greenhouse climate control an integrated approach. Wageningen Pers, Wageningen, 1995* *Kurpaska S.: Greenhouses and foil tunnel- engineering and proceses (in Polish). PWRiL, Poznań, 2007* *S. Kurpaska Z. Ślipek, B. Bożek, J. Frączek: Simulation of heat and moisture transfer in the greenhouse substrate due to warming system by buried pipes. Biosystems Engineering 90(1), 63-74, 2005.*
Supplementary	*McDonald R., McCollum T.: Temperature of water heat treatment influences tomato fruit quality following low-temperature storage. Posthavaster Biology and Technology, 16(2), 1999.* *PN-B-03406: 1994. Design heat demand for rooms with a capacity of up to 600 m3* *PN-EN 12831: 2006. Heating installations in buildings. Method for calculating the design heat load* *Company catalogs of hoses, couplings, valves, hydraulic and pneumatic accumulators.* *Polish Standard PN-92 / B-01706, Water supply installations. Requirements in design, PKNMiJ, 1992* *Katalogi firmowe przewodów, złączek, zaworów, akumulatorów hydraulicznych i pneumatycznych.* *Polska Norma PN-92/B-01706, Instalacje wodociągowe. Wymagania w projektowaniu, PKNMiJ, 1992*

Structure of learning outcomes:

Discipline: TZ				4,0	ECTS**
Structure of student activities:					
Contact hours		50	hours	2	ECTS**
including:	lectures	20	hours		
	classes and seminars	25	hours		
	consultations	3	hours		
	participation in research	…	hours		
	mandatory trainerships	…	hours		
	participation in examinations	2	hours		
e-learning		…	hours	…	ECTS**
student own work		50	hours	2	ECTS**

*** where 10 hours of classes = 1 ECTC (in case of 15 h → 2 ECTS)**

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

academic discipline code: RZ - animal science and fishery, PB - biological sciences, etc.