

SYLLABUS

Name of the course (as specified in the approved curriculum) SUSTAINABLE HORTICULTURE		Number of ECTS credits 8
Name of the course in Polish OGRODNICTWO ZRÓWNOWAŻONE		
Unit providing the course (Department/Institute) Department of Vegetable Crops, Dep. of Entomology and Environmental Protection, Dep. of Phytopathology and Seed Science, Dep. of Dendrology, Pomology and Nursery		
Course leader DR JOLANTA Lisięcka		
Field of study HORTICULTURE	Level II	Semester 2
TYPE OF CLASSES (course load)		
- Lectures	30	
- Practical classes	45	
- Contact hours (exam, correction exam, reports correction, consultations)	40	
- Self-study (preparation for classes and exam, reports preparation)	85	
Total number of hours		200
OBJECTIVE OF THE COURSE		
History, principles and practices of sustainable horticulture. Factors determining the quality of horticultural production. Environmentally friendly pest and disease control. Optimising plant growing conditions.		
TEACHING METHODS		
<ul style="list-style-type: none"> • lectures (power point presentations) • practicals – demonstrations, calculations and field trips 		
Course learning outcomes		The reference to field of study outcomes
Knowledge	<p>O1. Student knows in the profound degree effects of abiotic and biotic factors on the plant growth, development and crop quality</p> <p>O2. Student knows in the profound degree principles of integrated and organic horticultural production in the field and under covers</p>	H2_K03 H2_K09
Skills	<p>O3. Student can find, analyse and creatively use needed information received from different sources concerning environmentally friendly horticultural production</p> <p>O4. Student can single-handedly and comprehensively identify and analyse phenomena affecting the state of crop environment and can optimise plant growing conditions</p>	H2_S01 H2_S03
Social skills	<p>O5. Student is ready critically evaluate information coming from different sources concerning environmentally friendly horticultural production</p>	H2_C01
Methods of evaluation of outcomes achievement		Symbols of course learning outcomes
<ul style="list-style-type: none"> • written exam • written reports • calculation tasks • self-reflection on the assessment of possessed knowledge and skills 		O1-O2 O3 O4 O5
TEACHING CONTENT		
<p>Lectures Sustainability – definition, principles and concepts. Organic production in Poland and in the world. Vegetable grafting. Methods and substrates used in greenhouse vegetable cultivation. Irrigation and fertigation in greenhouses. Reducing greenhouse energy consumption. Climate control in greenhouses.</p> <p>Principles of sustainable fruit production. Integrated Fruit Production (IFP) and Organic Fruit Production (OFP) systems. Pest and disease control in IFP and OFP systems. Directions in disease resistance breeding and pesticide application techniques. Managing environmental risk in sustainable fruit production.</p> <p>Indirect crop protection: farming practices without negative impact on the agroecosystems. Protection and augmentation of antagonists. Diversity of insects and their impacts on agrocenoses. Monitoring and forecasting systems in crop protection. The role of direct crop protection.</p> <p>Classes Sensory analysis of horticultural products from conventional and organic cultivation. Tomato and cucumber grafting. Basic calculation for irrigation and fertigation in greenhouses. Linear programming method – optimization of fertilisers amount for fertigation. Simulations of climate control in greenhouses.</p> <p>Management of fruit crops yield quantity – quality relations. Major trends in fruit tree training systems and canopy designs in temperate climate zone. Fruit harvest and post-harvest treatments in IFP.</p> <p>The assessment of pest prophylactic treatments. Insects identification: pests and beneficials. The use of prognostic models of insects development. Economic thresholds and tolerance levels. The evaluation of toxicological properties and side effects of plant protection products. Mitigation strategies to reduce pesticide inputs into environment, a role of spraying technique.</p> <p>Determination of selected pathogens of horticultural plants based on appropriate symptoms and signs of etiological. Field trips.</p>		

The course completion criteria and methods Written exam (passing practicals is a prerequisite for taking the exam)	Percent of a final grade 100%
RECOMMENDED LITERATURE Basic literature Agrios G.N. 2005. Plant pathology, 5th Edition. Elsevier Academic Press. Granatstein D. 2003. Tree fruit production with organic farming methods. Wenatchee (WA) Center for Sustainable Agriculture and Natural Resources, Washington State University. Available at the Web site: http://organic.rfrec.wsu.edu/OrganicIFP/OrganicFruitProduction/OrganicMgt.pdf Gregoire C., Elsaesser D., Huguenot D., Lange J., Lebeau T., Merli A., Mose R., Passeport E., Payraudeau S., Schütz.T., Schulz R., Tapia-Padilla G., Tournebize J., Trevisan M., Wanko A. 2009. Mitigation of agricultural nonpoint-source pesticide pollution in artificial wetland ecosystems – a review. In: Lichtfouse E. (eds) Climate Change, Intercropping, Pest Control and Beneficial Microorganisms. Sustainable Agriculture Reviews, vol. 2: 293-338. Springer, Dordrecht Gullan P.J. P.S. Cranston 1999. The Insects. An Outline of Entomology. Blackwell Science Ltd. University of California, Davis, USA. Lane C., Beales P., Hughes K. 2012. Fungal plant pathogens. CABI, Wallingford UK. Pedigo L.P. 1999. Entomology and Pest Management. Prentice-Hall, Inc. New Jersey, USA. Régnière J., Powell J., Bentz B., Nealis V. 2012. Effects of temperature on development, survival and reproduction of insects: experimental design, data analysis and modeling. <i>Journal of Insect Physiology</i> 58(5): 634-647. Sai Platform. 2013. Principles and Practices for Sustainable Fruit Production. http://www.saiplatform.org/uploads/Library/PPsFruit2009-2.pdf Snowdown A.L. 1991. A colour atlas of post-harvest diseases and disorders of fruits and vegetables. Scientific Wolfe Ltd, Aylesbury, England. The International Federation of Organic Movements (http://www.ifoam.bio) Supplementary literature Altieri M.A. 1999. The ecological role of biodiversity in agroecosystems. <i>Agriculture, Ecosystems and Environment</i> 74: 19-31. Benton T.G., Vickery J. A., Wilson J.D. 2003. Farmland biodiversity: is habitat heterogeneity the key? <i>Trends in Ecology & Evolution</i> 18(4): 182-188. Cerutti A.K., Bruun S., Beccaro G.L., Bounous G. 2011. A review of studies applying environmental impact assessment methods on fruit production system. <i>J. Environ. Manage.</i> 92; 2277-2286. Granatstein D., Kupferman E. 2006. Sustainable horticulture in fruit production. <i>Acta Hort.</i> 767: 295-308. Granatstein D., Sanchez E. 2009. Research knowledge and needs for orchard floor management in organic tree fruit system. <i>International Journal of Fruit Science</i> 9(3): 257-281. Honěk A., Kocourek F. 1990. Temperature and development time in insects: a general relationship between thermal constants. <i>Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere</i> 117(4): 401-439. Hunt J., Anderson B., Phillips B., Tjeerdema R., Largay B., Beretti M., Bern A. 2008. Use of toxicity identification evaluations to determine the pesticide mitigation effectiveness of on-farm vegetated treatment systems. <i>Environmental Pollution</i> 156(2): 348-358. Juroszek P., Lumpkin T.A., Palada M.C. 2008. Sustainable Vegetable Production Systems. <i>Acta Hort.</i> 767: 133-149. Kirby E., Willer H. & Granatstein D. 2012. Global area and trends of organic fruit production. <i>Acta Hort.</i> 1001: 383-394. Kubota C. and McClure M.A. 2008. Vegetable Grafting: History, Use, and Current Technology Status in North America. <i>HortScience</i> 43(6): 1664-1669. Lal R. 2008. Sustainable Horticulture and Resource Management. <i>Acta Hort.</i> 767: 19-42. Lee J.M., Kubota C., Tsao S.J., Bie Z., Hoyos Echevarria P., Morra L., Oda M. 2010. Current status of vegetable grafting: Diffusion, grafting techniques, automation. <i>Scientia Horticulture</i> 127(2): 93-105. Peck G.M., Andrews P.K., Reganold J. P. & Fellman J.K. 2006. Apple orchard productivity and fruit quality under organic, conventional, and integrated management. <i>HortScience</i> 41(1): 99-107. Stehle S., Elsaesser D., Gregoire C., Imfeld G., Niehaus E., Passeport E., Schulz R. 2011. Pesticide risk mitigation by vegetated treatment systems: a meta-analysis. <i>Journal of Environmental Quality</i> 40(4): 1068-1080.	