

Sveučilište u Zagrebu Agronomski fakultet University of Zagreb Faculty of Agriculture



TABLE: COURSE DESCRIPTION

1. GENERAL INFORMATION						
1.1. Course teacher	Prof. Renata Bažok, PhD	1.6. Year of the study programme	1			
1.2. Name of the course	Sustainable insect pest control strategies	1.7. Credits (ECTS)	6			
1.3. Associate teachers	Assistant professor Maja Čačija, PhD Assistant professor Darija Lemić, PhD	1.8. Form of teaching (number of teaching hours L+S+E+e-learning)	L10+S8+E6+6e- learning			
1.4. Study programme (undergraduate, graduate, integrated)	Postgraduate	1.9. Expected enrolment in the course	3			
1.5. Status of the course	Elective	1.10. Level of application of e- learning (level 1, 2, 3), percentage of online instruction (max. 20%)	2, 20%			
2. COURSE DESCRIP	TION					
2.1. Course objectives	Course will enable students to generate and relate acquired knowledge for planning research activities in the area of sustainable insect pest control tools and methods. They will be able to devise and evaluate new strategies of insect pest control in terms of providing safe food production and environmental protection; Students will gain required knowledge to compare and summarize different methods and techniques for monitoring resistance of insects to insecticides, combine and assess alternative strategies (application of biopesticides, RNA interference and non-pesticide compounds) in the control of pests in order to create suitable basis for rational and sustainable use of insecticides					
2.2. Course enrolment requirements and entry competences required for the course	Basic knowledge about insect pests, knowing morphology, anatomy and phisiology of insects.					
2.3. Learning outcomes at the level of the programme to which the course contributes	 Identify research problem in the field of agriculture and rural development and to evaluate basic types of research in agriculture and related fields Categorize basic concepts of scientific research: set-up explicable hypothesis, determine the measurable research goals and design original research in the field of agriculture, primary processing and food production, environmental protection and rural development Select and use appropriate scientific methods in the research process 					



	(analytical, synthetic, quantitative, statistical and socio-economic analysis, etc.)				
	4. Critically analyse and evaluate the results of its own scientific research, interpret and argue against larger and more complex social groups and present the latest technical, technological and socio-economic knowledge in the field of agriculture and related activities				
	 Publish research results in high-ranking journals with the aim of disseminating new knowledge and to apply new knowledge and skills in production and economic practices in the field of agriculture and related activities 				
	Actively participate in the preparation of studies, project proposals, strategic and operational documents in the field of agriculture and rural development				
	 Create new proposals (individually and/or in teams) to solve the problem of agricultural production and rural development in changing and unknown natural, productive, economic and socio-political conditions and circumstances 				
	10. Individually suggest and take part in the adoption of measures for agricultural, environmental and rural development policies				
	 Develop research and learning skills necessary for lifelong learning and continuous improvement and development of the acquired knowledge (formal, unformal and informal) 				
	12. Follow, synthesize and evaluate national and international scientific and professional literature and to evaluate the scientific and professional work in the field of agriculture				
	1. Distinguish and argue the advantages and disadvantages of chemical and non- chemical methods of pest control.				
2.4. Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	2. Criticaly evaluate the toxicological and ecotoxical properties of available insecticides (efficacy, residual effects, phytotoxicity, impact on beneficials and resistance development) and describe and elaborate their potential for sustainable plant protection.				
	3. Analyze and critically evaluate current achievements and trends in pest control in accordance with environmentally friendly and sustainable use of insecticides.				
	4. Choose and apply adequate methods for the evaluation of the insecticides;				
	5. Set hypotheses and goals and select appropriate methods of scientific research in the field of sustainable pest control.				
	6. Create a strategy, study or document in the field of sustainable pest control.				
	7. Express responsibility for ethical aspects of the application of insecticides;				

2.5. Co brok deta class (sylla	ourse content en down in il by weekly s schedule abus)				
Hours	Title of the course unit	Format of instruction (symbol 2.6.)	Teacher/s	Description of teaching units (max. 200 characters)	Connection with learning outcomes (2.4.)
4	Chemical pest control	L I E	Renata Bažok	 1.Advantages and disadvantages of chemical method of insect pest control; a) Toxicology and ecotoxicology of insecticides b) Mechanism of resistance c) Interruptions in natural balance between pests and their natural enemies d) Phytotoxicity 	1, 7
6	Insecticides	L e-L M S	Renata Bažok, Darija Lemić	Development and screening of insecticides and their formulations Standards of the environmental acceptability of insecticides; Classification of insecticides according to the mode of action, chemical class and efficacy; Fate of PPs in the soil, water and plant; Residual effects on crops in rotation;	2, 4
6	Research methods	E. M, Lab, W	Renata Bažok Darija Lemić	Methodology of research in phytopharmacy: laboratory and field trial for investigation of efficacy; Investigation of resistance, establishing side effect of PPs- influence on non target organisms, beneficials, domestic animals and environment;	2, 4, 5, 7
4	New developments in non- chemical methods for insect pest control	L e-L	Maja Čačija Darija Lemić	Mechanical methods Physical methods Ecologically friendly insecticides and their combination with other insecticides or tools	3, 4
4	Strategies for area wide insect pest control and tools for implementation	LS	Renata Bažok	Area-wide pest management principles Mass trapping Confusion Sterile insect techniques Push-pull strategy Combination of the insecticides	3, 4, 6, 7
6	New techniques for pest control	L S	Renata Bažok	GMO organisms, RNA interference, ozone application.	3, 4, 6, 7

		E	Darija Lemić Maja Čačija					
i		x	lectures (L) x		independent assignments (I) 2.7.		2.7. Com	ments:
2.6. Form of teaching	x	seminars and x workshops (S)		multimedia and the internet (M)				
	x	exercises (E) x		laboratory				
(m	(mark with X)	x	on line in entirety (e-L)	line in x		work with mentor (W)		
			partial e- learning (Pe-L)	(other)		er)		
			field work (F)		(other)			
2.8. Sto resp	udent oonsibilities	Class attendance, preparation of seminars and materials for workshops and active participation in seminars and workshops						
2.9. Sc stud	creening lent work	0.2	Class attendance		2	Research		Practical training
(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS	0.8	Experimental work			Report		(other)	
		Essay		1	Seminar es	say	(other)	
		Tests		2	Oral exam		(other)	
value of the course)			Written exam			Project		(other)
2.10. G eval work at th	Grading and luating student k in class and he final exam	During classes, the student's work is evaluated by his active participation in classes and the preparation and presentation of a seminar paper. The final oral exam evaluates the adoption of the material and the student's ability to critically review, analyze and propose solutions in the field of evaluation and application of plant protection products and alternative measures and tactics for sustainable pest control.						
		Title			Nu	mber of copi the library	ies in	Availability via other media
2.11. Required literature (<i>available</i> <i>in the library and</i> <i>via other media</i>)	Murad Ghanim and Isaac Ishaaya (2011): Insecticides wit Novel Modes of Action Mechanism and Resistance Management			0		3	/es	
	Gilbert, L.I., latrou, K., Gill, S.S. (2005). Comprehensive Molecular Insect Science, vol. I- VI. Elsevier, Oxford.			1			10	
	Senthil-N (2015): A Biopestic Action Ac DOI: 10.1 5_3	hil-Nathan, Sengottayan b): A Review of esticides and Their Mode of n Against Insect Pests, 10.1007/978-81-322-2056-				}	/es	

	EPPO Standards, Guidelines for the efficacy evaluation of plant1 protection products		yes		
	Test methods - IRAC (https://irac-online.org/methods/)	yes			
	Kreiger, R. (Ed). Hayes' Handbook of Pesticide Toxicology. Academic Press, London, UK, 2010.		no		
	Dewhurst, C.I., Marrs, C.T. Toxicology of Pesticides. In: General and Applied Toxicology (Third edition), Ballantyne, B, Marrs, C.T., Syversen, T. (Eds). John Wiley and Sons, Ltd, West Sussex, England, 2011.	0	no		
	OECD test guidelines for the chemicals.		yes		
2.12. Optional literature (<i>at the</i> <i>time of submission</i> <i>of study</i> <i>programme</i> <i>proposal</i>)	Pretty, J. (2005) The Pesticide Detox/ Towards more sustainable agriculture. Earthscan, London McFarlane, N.R. (1977): Crop Protection Agents- their biological evaluation. Academic Press, London Corbett J. R. (1974). The Biochemical Mode of Action of Pesticides. Academic Press Inc., London Yamamoto, I., Casia, J.E. (1999): Nicotinoid insecticides and the Nicotinic Acetylcholine receptor. Springer Verlag, Tokyo Rechcigl, J.E., Rechcigl, N.A. (2000) Insect Pest Management /Techniques for Environmental Protection Lewis Publishers, London				
2.13. Quality assurance methods that ensure the acquisition of exit competences	Quality assessment will be checked as it is commonly performed for all modules at the University of Zagreb – through anonymous student questionnaire at the end of the semester. Module delivery success rate will be monitored by the Board for Quality assurance of the Uni ZG Faculty of Agriculture.				
2.14. Other (as the proposer wishes to add)					