Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Izbrana poglavja o socialnih žuželkah**
Course title:	**Selected Topics in Social Insects**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja		**1. ali 2.; 1st or 2nd**	**1. 2. ali 3. ; 1st, 2nd or 3rd**
Doctoral Study Ecological Sciences, 3rd degree			

Vrsta predmeta / Course type	Izbirni/Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
5	**5**				**140**	**5**

Nosilec predmeta / Lecturer:	Dušan DEVETAK

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Poznavanje entomologije na ravni drugostopenjskega programa	Knowledge of entomology at master level

Vsebina:	**Content (Syllabus outline):**
Obravnavana so izbrana poglavja iz naslednjih Sklopov: - Klasifikacija žuželk in tipi postembrionalnega razvoja, znacilnosti vecjih redov žuželk. - Definicije: kaste, evsocialnost, homeostaza, polietizem, polimorfizem pri cebelah, socialne žuželke, superorganizem. - Medonosna cebela kot model socialne skupnosti žuželk: anatomija in fiziologija (zgradba in delovanje) telesa medonosne cebele, zgradba cebeljega gnezda, oblikovanje kast in diferenciacija osebkov, dejavnosti osebkov: delavk, matice, trotov; letni razvojni	Selected topics in the following chapters are Discussed: - Insect classification and types of post-embryonic development; characteristics of the major orders of insects. - Definitions: caste, eusocial, homeostasis, polyethism, polymorphism as found in bees, social insects, superorganism, - Honey bees as model of social insect: Anatomy and physiology of honey bee, nest arhitecture, caste development and differentiation, activities of workers, queens and drones, honey bee colony seasonal cycle.

ciklus cebelje družine. - Reproduktivna citologija in partenogeneza, genetska struktura družine: paritveno vedenje, sestava poddružin cebelje družine; selekcija in vzreja: genetska in vedenjska variabilnost, odpornost na bolezni, biokemijska variabilnost. - Dejavnosti in vedenje mednosne cebele: delitev dela, starost delavk in dejavnosti znotraj družine, komunikacija, izmenjava hrane, obramba družine, ropanje, čiščenje gnezda, pašne aktivnosti, rojenje. Brezmaticne cebele. - Cebelji feromoni. Gojitev cebel. - Principi simbioze; mehanizmi patogeneze pri žuželkah – napadenost gostitelja, entomopatogene bakterije, virusi, plesni, paraziti; imunost gostitelja – kutikularna in crevesna bariera.	- Reproductive cytology and parthenogenesis, genetic organisation of colonies: mating behaviour, subfamily structure of colonies; selective breeding: genetic variability, behaviour variability, disease resistance, biochemical variability. - Activities and behaviour of honey bees: division of labour, worker age and activities inside the hive, communication, food transmission, colony defense, robbing, nest cleaning, foraging, swarming. Queenless bees. - Honeybee pheromones. Apiculture. - Concepts of symbiosis; mechanisms of pathogenesis in insects - host invasion, entomopathogenic bacteria; viruses, fungi, parasites; host immunity - cuticle and gut barriers.

Temeljni literatura in viri / Readings:

•Zhanna Reznikova (2007). Animal Intelligence: From Individual to Social Cognition. 1st ed. Cambridge University Press

• Price, P. W. (2011). Insect Ecology: Behavior, Populations and Communities. Cambridge University Press

• Gregorc, A., (2002). Medonosna čebela in osnove čebelarjenja. Veterinarska fakulteta, Univ. Ljubljana.

• Gregorc, A., (2005). Vzreja čebeljih matic (Apis mellifera carnica). Čebelarska zveza Zgornje Gorenjske, Žirovnica.

• Veselič, Ž., Justinek, J., Šivic, F., Kandolf, A., Magdič, T. (2013). Gozd in čebele : čebelarjenje v gozdovih. Brdo pri Lukovici: Čebelarska zveza Slovenije. Zavod za gozdove Slovenije.

Cilji in kompetence:	**Objectives and competences:**
- Podrobno predstaviti znanja o fiziologiji, morfologiji in vedenju žuželk, s poudarkom na razumevanju cebelje družine kot modela - Podati poglobljena znanja, potrebna za študij specificnih podrocij socialnih žuželk - Zagotoviti razumevanje fizioloških in patoloških procesov v cebelji družini in pri posameznem osebku - Podrobno pokazati možna raziskovalna podrocja in interakcije med cebelami in vplivi okolja	- To provide advanced knowledge in the physiology, morphology and behaviour of insects, particularly in relation to understand honeybee colony as a model - To acquire advanced knowledge necessary to study specific fields in social insects - To provide advanced understanding of the physiological and pathological processes in bee colony and in an individual bee - To demonstrate in detail possible research fields and interaction between bees and environmental influences

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: Po koncanem študiju mora biti študent sposoben: - Podrobno razumeti koncept klasifikacije žuželk, fiziologijo družine medonosne cebele in posameznega osebka - Podrobno razumeti patogene in druge okoljske vplive - Podrobno spoznati vidike vedenja, patologijo in rejo medonosne cebele - Podrobno ugotoviti prednosti in slabosti adaptacijskih sistemov pri cebelah - Podrobno razlikovati rase cebel ter primerjati njihov pomen za raziskave in cebelarsko prakso **Prenesljive/ključne spretnosti in drugi atributi:** Študenti se usposobijo: - Uporabiti laboratorijske spretnosti, potrebne za samostojno reševanje raziskovalnih problemov in izvedbo poskusov - Za uporabo vrhunske znanstvene literature pri predstavitvi in publiciranju lastnih izsledkov	**Knowledge and understanding:** After taking this course the student should be able to: - Acquire advanced concepts of insect classification, physiology of honey bee colony and individual bee - Understand advanced pathogenic and other environmental influences - Get advanced knowledge of aspects of honey bee behaviour, pathology and breeding - Define in detail the strengths and weaknesses of bees adaptations systems - Distinguish in detail bee races, and compare their importance in scientific research and in beekeeping practice **Transferable/Key Skills and other attributes:** Transferable/Key Skills and other attributes: Students qualify to: - Use laboratory skills which are essential for an independent solving of research problems and experiments performance - Use advanced scientific publications for presenting and publishing their work

Metode poučevanja in učenja:	Learning and teaching methods:
- Predavanja - Laboratorijske vaje	- Lectures - Laboratory excersises

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
- Kolovij - Izpit	50% 50%	- Partial exam - Exam

Reference nosilca / Lecturer's references:

1. DEVETAK, Dušan, OMERZU, Manja, CLOPTON, Richard E. Notes on the gregarines (Protozoa: Apicomplexa: Eugregarinorida) of insects in Slovenia. *Annales, Series historia naturalis*, ISSN 1408-533X, 2013, letn. 23, št. 1, str. 73-89, ilustr. [COBISS.SI-ID 20087304]

2. DEVETAK, Dušan, PODLESNIK, Jan, KLOKOČOVNIK, Vesna, JANŽEKOVIČ, Franc. Antlions (Insecta: Neuroptera: Myrmeleontidae) of Albania. *Turkish journal of zoology*, ISSN 1300-0179, 2013, vol. 37, iss. 3, str. 362-366, ilustr., doi: 10.3906/zoo-1209-23. [COBISS.SI-ID 19864328], [JCR, SNIP, WoS do 16. 9. 2013: št.

citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 10. 6. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]

3. DEVETAK, Dušan. Substrate particle size-preference of wormlion Vermileo vermileo (Diptera: Vermileonidae) larvae and their interaction with antlions. *European Journal of Entomology*, ISSN 1210-5759, 2008, issue 4, vol. 105, str. 631-635, ilustr. [COBISS.SI-ID 16213768], [JCR, SNIP, WoS do 11. 8. 2014: št. citatov (TC): 8, čistih citatov (CI): 8, normirano št. čistih citatov (NC): 7, Scopus do 9. 6. 2014: št. citatov (TC): 8, čistih citatov (CI): 8, normirano št. čistih citatov (NC): 7]