



Univerza v Mariboru



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Fakulteta za naravoslovje in
matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Komunikacija živali
Course title:	Animal Communication

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biologija in ekologija z naravovarstvom, 2. stopnja	/	1/2	Poletni/ Zimski
Biology and Ecology with Nature Conservation, 2 nd Level	/	1/2	Summer/ Winter

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15	30				135	6

Nosilec predmeta / Lecturer: Andrej Čokl, Dušan Devetak

Jeziki / Languages:	Predavanja / Lectures:	Slovensko / Slovene
	Vaje / Tutorial:	Slovensko / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Poznavanje eksperimentalnih metod v fiziologiji živali.

Knowledge of experimental methods in animal physiology.

Vsebina:

Oddajanje, prenos in sprejemanje informacije

- Zvok (lastnosti, oddajanje, širjenje, sprejemanje)
- Svetloba (lastnosti, oddajanje in prenos ter sprejemanje svetlobnih signalov)
- Kemični signali (splošne lastnosti, oddajanje, širjenje in sprejemanje kemičnih signalov)
- Elektrorepcija (lastnosti električnega polja, ustvarjanje bio-električnih polj, električna polja in medij, zaznavanje električnih signalov, komunikacija in električni signali)

Optimizacija prenosa informacije

- Optimizacija komunikacije
- Količina informacije
- Vrednost informacije
- Kodiranje
- Evolucija signalov
- Cena in pritiski razvoja signalov
- Pravila oblikovanja signalov

Teorija igre in strategije signaliziranja

- Evolucijska teorija igre
- Poštenost signaliziranja
- Reševanje konfliktov
- Igre teritorialnega signaliziranja
- Signaliziranje v času parjenja
- Socialna integracija
- Signali okolja
- Avtokomunikacija

Content (Syllabus outline):

Production, transmission and reception of signals

- Sound (properties, production, propagation, reception)
- Light (properties, production, transmission and reception of light signals)
- Chemical signals (general features, production, transmission and reception of chemical signals).
- Electroreception (properties of electric fields, generation of bio-electric fields, coupling of electric signals to the medium, reception of electric signals, communication and electric signals)

Optimizing information transfer

- Optimizing communication
- The amount of information
- The value of information
- Coding
- Signal evolution
- Costs and constraints on signal evolution
- Signal design rules

Game theory and signalling strategies

- Evolutionary game theory
- Signal honesty
- Conflict resolution
- Territorial signalling games
- Mating games and signalling
- Social integration
- Environmental signals
- Autocommunication

Temeljni literatura in viri / Readings:

- Bradbury, J. W., S. L. Vehrencamp, 1998: Principles of Animal Communication, 1998. Sinauer Associates Inc., Publishers, Sunderland, Massachusetts.
- Alcock, J., 2005: Animal behavior: an evolutionary approach. 8th ed. Freeman, Sunderland.

Cilji in kompetence:

- Predstaviti temeljne lastnosti signalov različnih modalitet
- Pojasniti vpliv medija na lastnosti signalov
- Razložiti prilagoditve receptorjev za optimalno zaznavanje adekvatnih signalov
- Definirati parametre informacije in pojasniti mehanizme za optimizacijo prenosa informacije
- Razložiti komunikacijske procese v različnih kontekstih vedenja
- Sposobnost razumevanja pomena

Objectives and competences:

- To explain basic properties of signals of different modalities
- To elucidate the influence of transmission media on signal properties
- To explain sensory adaptations for optimal reception of adequate signals
- To define information parameters and to explain mechanisms for optimizing information transfer
- To explain communication processes in different behavioural contexts

komunikacije

- Sposobnost uporabe temeljnega znanja o komunikaciji v kontekstu biološke kontrole, uporabe novih tehnologij in informatike

- Ability to understand the role of communication
- Ability to use basic knowledge on communication in the context of biological control, the use of new technologies and information sciences

Predvideni študijski rezultati:

Znanje in razumevanje:

- Vloga medija na oddajanje in sprejemanje signalov
- Nadgradnja razumevanja temeljnih fizioloških procesov, povezanih z komunikacijo
- Spoznavanje temeljnih procesov in evolucije komunikacije z definicijami parametrov informacije
- Razumevanje razvoja in optimizacije komunikacije
- Vedenje in vloga komunikacije

Intended learning outcomes:

Knowledge and understanding:

- The role of medium on signal production and reception
- Upgrading of understanding basic physiological processes in relation to communication
- Learning of basic processes and evolution of communication with definitions of information parameters
- Understanding of evolution and optimization of communication
- Behaviour and the role of communication

Metode poučevanja in učenja:

- Predavanja
- Seminar

Learning and teaching methods:

- Lectures
- Seminar

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
• Seminaraska naloga	50	• Seminar essay
• Pisni izpit	50	• Written exam

Reference nosilca / Lecturer's references:

LAUMANN, Raúl Alberto, ČOKL, Andrej, LOPES, Ana P. S., FERREIRA, Jonatas B. C., MORAES, Maria C. B., BORGES, Miguel. Silent singers are not safe : selective response of a parasitoid to substrate-borne vibratory signals of stink bugs. *Anim. behav.*, 2011, vol. 82, no. 5, str. 1175-1183. <http://dx.doi.org/10.1016/j.anbehav.2011.08.017>,

doi:[10.1016/j.anbehav.2011.08.017](https://doi.org/10.1016/j.anbehav.2011.08.017). [COBISS.SI-ID [2445135](#)]

POHLEVEN, Jure, BRZIN, Jože, VRABEC, Lara, LEONARDI, Adrijana, ČOKL, Andrej, ŠTRUKELJ, Borut, KOS, Janko, SABOTIČ, Jerica. Basidiomycete *Clitocybe nebularis* is rich in lectins with insecticidal activities. *Appl. microbiol. biotechnol.*, 2011, vol. 91, no. 4, str. 1141-1148, doi: [10.1007/s00253-011-3236-0](https://doi.org/10.1007/s00253-011-3236-0). [COBISS.SI-ID [24763431](#)]

DE GROOT, Maarten, ČOKL, Andrej, VIRANT-DOBERLET, Meta. Species identity cues : possibilities for errors during vibrational communication on plant stems. *Behav. ecol.*, 2011, vol. 22, str. 1209-1217. <http://dx.doi.org/10.1093/beheco/arr115>, doi: [10.1093/beheco/arr115](https://doi.org/10.1093/beheco/arr115). [COBISS.SI-ID [2404175](#)]

DE GROOT, Maarten, ČOKL, Andrej, VIRANT-DOBERLET, Meta. Search behaviour of two hemipteran species using vibrational communication. *Cent. Eur. j. biol.*, 2011, no. 5, vol. 6, str. 756-769. <http://dx.doi.org/10.2478/s11535-011-0056-2>, doi: [10.2478/s11535-011-0056-2](https://doi.org/10.2478/s11535-011-0056-2). [COBISS.SI-ID [2423631](#)]

DEVETAK, Dušan, NOVAK, Tone, JANŽEKOVIČ, Franc. Effect of substrate density on behaviour of antlion larvae (Neuroptera: Myrmeleontidae). *Acta oecologica*. [Print ed.], 2012, vol. 43, str. 1-7. [COBISS.SI-ID [19210248](#)]

KLOKOČOVNIK, Vesna, DEVETAK, Dušan, ORLAČNIK, Marina. Behavioral plasticity and variation in pit construction of antlion larvae in substrates with different particle sizes. *Ethology*, Nov. 2012, vol. 118, iss. 11, str. 1102-1110, doi: [10.1111/eth.12012](https://doi.org/10.1111/eth.12012). [COBISS.SI-ID [19324936](#)]

DEVETAK, Dušan. Substrate particle size-preference of wormlion *Vermileo vermileo* (Diptera: Vermileonidae) larvae and their interaction with antlions. *Eur. j. entomol.*, 2008, issue 4, vol. 105, str. 631-635, ilustr. [COBISS.SI-ID [16213768](#)]

MENCINGER VRAČKO, Bojana, DEVETAK, Dušan. Orientation of the pit-building antlion larva *Euroleon* (Neuroptera, Myrmeleontidae) to the direction of substrate vibrations caused by prey. *Zoology*. [Print ed.], 2008, vol. 111, iss. 1, str. 2-8, ilustr. [COBISS.SI-ID [15674632](#)]

DEVETAK, Dušan, MENCINGER VRAČKO, Bojana, DEVETAK, Miha, MARHL, Marko, ŠPERNJAK, Andreja. Sand as a medium for transmission of vibratory signals of prey in antlions *Euroleon nostras* (Neuroptera: Myrmeleontidae). *Physiol. entomol.*, Sep. 2007, vol. 32, no. 3, str. 268-274, ilustr. <http://www.ingentaconnect.com/content/bsc/pent>. [COBISS.SI-ID [15465736](#)]