

GENEL TANIM / GENERAL DESCRIPTION

Ders Adı / Course Name	Posionous Invertebrate Animals - / Posionous Invertebrate Animals -	
Ders Kodu / Course Code	9105035752022	
Ders Türü / Course Type		
Ders Seviyesi / Course Level	Second Cycle / Second Cycle	
Ders Akts Kredi / ECTS	8.00	
Haftalık Ders Saati (Kuramsal) / Course Hours For Week (Theoretical)	3.00	
Haftalık Uygulama Saati / Course Hours For Week (Objected)	0.00	
Haftalık Laboratuar Saati / Course Hours For Week (Laboratory)	0.00	
Dersin Verildiği Yıl / Year	1	
Öğretim Sistemi / Teaching System	Face to Face / Face to Face	
Eğitim Dili / Education Language	Turkish / Turkish	
Ön Koşulu Olan Ders(ler) / Precondition Courses	Yok	None
Amacı / Purpose	Bu dersin amacı çevremizde yer alan çeşitli zehirli omurgasız hayvanlar ve zehirleri hakkında bilgi sahibi olarak bu canlılara karşı daha bilinçli yaklaşmaktır.	The aim of this course is to have a more conscious approach to these animals by having knowledge about various poisonous invertebrates and their poisons in our environment.
İçeriği / Content	<ul style="list-style-type: none"> • Hayvan zehirlerinin önemli biyolojik işlevleri • Denizel zehirli omurgasız hayvanlar ve özellikleri • Karasal zehirli omurgasız hayvanlar ve özellikleri • Zehirli omurgasız hayvanların korunması ve önemi 	<ul style="list-style-type: none"> • Important biological functions of animal poisons • Marine venomous invertebrates and their characteristics • Terrestrial venomous invertebrates and their characteristics • Protection and importance of venomous invertebrates
Önerilen Diğer Hususlar / Recommended Other Considerations	Yok	None
Staj Durumu / Internship Status	Yok	None
Kitap / Malzemesi / Önerilen Kaynaklar / Books / Materials / Recommended Reading	<p>Al-Asmari AK, Kunnathodi F, Saadon KA, Idris MM (2016) Elemental analysis of scorpion venoms. Journal of Venom Research 7:16-20.</p> <p>Ambrosone A, Marchesano V, Mazzarella V, Tortiglione C (2014) Nanotoxicology using the sea anemone Nematostella vectensis: from developmental toxicity to genotoxicology. Nanotechnology 8(5):508-520.</p> <p>Arıkan H, Akçiçek E (2013) Zehirli ve Tehlikeli Hayvanlar. Zooloji ve Tıp. 234s. Konak Belediyesi</p> <p>Baveja M, Sarkar A, Chakrabarty D (2018) Hemotoxic and wound healing potential of</p>	<p>Al-Asmari AK, Kunnathodi F, Saadon KA, Idris MM (2016) Elemental analysis of scorpion venoms. Journal of Venom Research 7:16-20.</p> <p>Ambrosone A, Marchesano V, Mazzarella V, Tortiglione C (2014) Nanotoxicology using the sea anemone Nematostella vectensis: from developmental toxicity to genotoxicology. Nanotechnology 8(5):508-520.</p> <p>Arıkan H, Akçiçek E (2013) Zehirli ve Tehlikeli Hayvanlar. Zooloji ve Tıp. 234s. Konak Belediyesi</p> <p>Baveja M, Sarkar A, Chakrabarty D (2018) Hemotoxic and wound healing potential of</p>

coelomic fluid of sea-star *Astropecten indicus*. The Journal of Basic and Applied Zoology. 79:27

Brand JM, Mpuru SP (1993) Dufour's gland and poison gland chemistry of the myrmicine ant, *Messor capensis* (Mayr). Journal of Chemical Ecology 19(7):1315-1321.
Camillo MAP (2005) Biodistribution studies of bee venom and spider toxin using radiotracers. J. Venom. Anim. Toxins incl. Trop. Dis. 11(1):39-50.

Chan BA, Elston DM (2021) Aquatic Antagonists: Sponge Dermatitis. Close encounter with the environment. 107(1):34-37.

Chen J, Cantrell CL, Shang H, Rojas MG (2009) Piperidine Alkaloids from the Poison Gland of the Red Imported Fire Ant (Hymenoptera: Formicidae). J. Agric. Food Chem. 57:3128-3133.

Chu YY, Qui P, Yu R (2020) Centipede Venom Peptides Acting on Ion Channels. Toxins 12, 230; doi:10.3390/toxins12040230

Cline EI, Wiebe LI, Young JD, Samuel J (1995) Toxic effects of the novel protein upi from the sea anemone *Urticina piscivora*. Pharmacological Research, 32(5):309-314.

Escoubas P, Diochot S, Corzo G (2000) Structure and pharmacology of spider venom neurotoxins. Biochimie 82:893-907.

Fange R, Lidman U (1976) Secretion of sulfuric acid in *Cassidaria echinophora* Lamarck (Mollusca: Mesogastropoda, Marine carnivorous snail). Comp Biochem Physiol. 53:101-103

Fratini F, Cilia G, Turchi B, Felicioli A (2017) Insects, arachnids and centipedes venom: A powerful weapon against bacteria. A literature review. Toxicon 130:91-103.

Gonzalez-Santillan E, Possani LD (2018) North American scorpion species of public health importance with a reappraisal of historical epidemiology. Acta Tropica 187:264-274

Gwee MCE, Nirthanan S, Khoo HE, Gopalakrishnakone P, Kini RM and Cheah LS (2002) Autonomic effects of some scorpion venoms and toxins. Clinical and Experimental Pharmacology and Physiology 29:795-801.

Hamed M, El-Naga EHA, Youssef NM, El-Sakka SS (2017) Effect of sea cucumbers *Holothuria atra* extract on hematological parameters and cardio enzymes in rats. J. Egypt. Acad. Soc. Environ. Develop., 18 (1): 11-19

Harrison PL, Abdel-Rahman Mohamed A, Miller K, Strong PN (2014) Antimicrobial peptides from scorpion venoms. Toxicon 88:115-137.

Hoyte CO, Cushing CA, Heard KJ (2012) Anaphylaxis to black widow spider antivenom. The American Journal of Emergency Medicine. 30, 836.e1-836.e2

Isbister GK, Gray MR (2002) A prospective study of 750 definite spider bites, with expert spider identification. Q J Med 95:723-731

Isbister GK, Hooper JNA (2005) Clinical effects of stings by sponges of the genus *Tedania* and a review of sponge stings worldwide. Toxicon 46:782-785.

Jimenez PC, Teixeira GLS, Wilke DV, Nogueira NAP, Hajdu E, Pessoa C, de Moraes MO, Costa-Lotufo LV (2004) Cytotoxic and antimicrobial activities of Hydro-methanolic extracts of sponges (Porifera) from Ceara State, Brazil. Arquivod de Ciencias do Mar 37:85-91.

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Junior VH, de Amorim PCH, Junior WTH, Cardoso JLC (2015) Venomous and poisonous arthropods: identification, clinical manifestations of envenomation, and treatments used in human injuries. *Revista da Sociedade Brasileira de Medicina Tropical* 48(6):650-657.

Kalinin VI, Aminin DL, Avilov SA, Silchenko AS, Stonik VA (2008) Triterpene glycosides from sea cucumbers (Holothurioidea, Echinodermata). *Biological activities and functions. Studies in Natural Products Chemistry* 35:135-194.

Kuwabara S (1994) Purification and properties of Peditoxin and the structure of its prosthetic group, pedoxin, from the Sea Urchin *Toxopneustes pileolus* (Lamarck). *The Journal of Biological Chemistry* 28:26734-26738.

Li R, Yu H, Yue Y, Liu S, Xing R, Chen X, Wang X, Li P (2014) In depth analysis of the in vivo toxicity of venom from the jellyfish *Stomolophus meleagris*. *Toxicon* 92:60-65.

Mebs Von Dietrich (2002) *Venomous and Poisonous animals. A Handbook for Biologists, Toxicologists and Toxinologists, Physicians and Pharmacists.* MedPharm CRC Press

Meier J (2008) *Venomous and poisonous animals-A Biologist's view.* In: *Handbook of: Clinical Toxicology of Animal Venoms and Poisons.*CRC Press

Monksa NR, Lernerb C, Henriques AT, Farias FM, Schapoval EES, Suyenagac ES, Rochaa AB, Schwartzmanna G, Mothes B (2002) Anticancer, antichemotactic and antimicrobial activities of marine sponges collected off the coast of Santa Catarina, southern Brazil. *Journal of Experimental Marine Biology and Ecology* 281:1-12.

Moustafa AY, Awaad A (2016) Comparative histopathological and histochemical impacts induced by the posterior salivary gland and ink sac extracts of *Octopus vulgaris* in mice. *The Journal of Basic & Applied Zoology* 74:23-26.

Nakos G (2003) Acute Fatal Toxic Myocarditis After Black Widow Spider Envenomation. *Annals of Emergency Medicine* 41(1):158

Nencioni ALA, Neto EB, de Freitas LA, Dorce VAC (2018) Effects of Brazilian scorpion venoms on the central nervous system. *Journal of Venomous Animals and Toxins including Tropical Diseases.* 24:3

Peigneur S, de Lima ME, Tytgat J (2018) *Phoneutria nigriventer* venom: A pharmacological treasure. *Toxicon* 151:96-110

Petricevich VL (2010) Scorpion Venom and the Inflammatory Response. *Mediators in Inflammation.* Article ID 903295. doi:10.1155/2010/903295

Rodrigoa AP, Costa PM (2019) The hidden biotechnological potential of marine invertebrates: The Polychaeta case study. *Environmental Research* 173:270-280.

Roldán-Wonga NT, Kiddb KA, Marmolejo-Rodríguez AJ, Ceballos-Vázquez BP, Shumilina E, Arellano-Martínez Marcial (2018) Bioaccumulation and biomagnification of potentially toxic elements in the octopus *Octopus hubbsorum* from the Gulf of California. *Marine Pollution Bulletin.* 129:458-468.

Schmidt CA, Daly NL, Wilson DT (2019) Coral venom toxins. *Frontiers in Ecology and Evolution* 7. article 320.

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Öğretim Üyesi (Üyeleri) / Faculty Member (Members)	Prof. Dr. Özlem ÇAKICI	Prof. Dr. Özlem ÇAKICI

ÖĞRENME ÇIKTILARI / LEARNING OUTCOMES

1	1- Hayvan zehirlerinin önemli biyolojik işlevlerini öğrenme	1) To learn the important biological functions of animal poisons
2	2- Denizel zehirli omurgasız hayvanları öğrenme	2) Learning about marine venomous invertebrates
3	3- Karasal zehirli omurgasız hayvanları öğrenme	3) Learning about terrestrial venomous invertebrates
4	4- Zehirli omurgasız hayvanların korunmasını kavrama	4) Understanding the importance of protecting poisonous invertebrates
5	5-Öğrenilen bilgiler ile çevremizdeki zehirli omurgasız hayvanlarla ilgili veri tabanını araştırabilme ve temel bir izleme araştırması tasarlayabilme	5) To design a monitoring study related to poisonous invertebrates in our environment based on the information learned

HAFTALIK DERS İÇERİĞİ / DETAILED COURSE OUTLINE

Hafta / Week					
	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
1	Hayvan zehirleri hakkında bilgilendirme				
	Information about animal poisons				
2	Denizel zehirli omurgasız hayvanlar -Süngerler (Porifera)				
	Venomous marine invertebrates -Sponges (Porifera)				
3	Denizel zehirli omurgasız hayvanlar -Kıvılcıklar (Cnidaria)				
	Venomous marine invertebrates -Cnidarians (Cnidaria)				
4	Denizel zehirli omurgasız hayvanlar -Poliketler (Polychaeta)				
	Venomous marine invertebrates -Polychaetes (Polychaeta)				
5	Denizel zehirli omurgasız hayvanlar -Gastropodlar (Gastropoda)				
	Venomous marine invertebrates -Gastropods (Gastropoda)				

	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
6	Denizel zehirli omurgasız hayvanlar -Ahtapotlar (Cephalopoda)				
	Venomous marine invertebrates -Octopuses (Cephalopoda)				
7	Denizel zehirli omurgasız hayvanlar -Derisidikenliler (Echinodermata)				
	Venomous marine invertebrates -Echinoderms (Echinodermata)				
8	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
	Arasınava				
	Midterm Exam				
9	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
	Karasal zehirli omurgasız hayvanlar -Böcekler: Arılar (Apidae) -Böcekler: Yaban Arıları (Vespidae)				
	Terrestrial venomous invertebrates -Insects: Bees (Apidae), -Insects: Wasps (Vespidae)				
10	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
	Karasal zehirli omurgasız hayvanlar -Böcekler: Karıncalar (Formicoidea) -Böcekler: Termitler (Isoptera)				
	Terrestrial venomous invertebrates -Insects: Ants (Formicoidea) -Insects: Termites (Isoptera)				
11	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
	Karasal zehirli omurgasız hayvanlar -Böcekler: Kelebekler (Lepidoptera) -Böcekler: kulağa kaçanlar(Forficuliadae)				
	Terrestrial venomous invertebrates -Insects: Butterflies (Lepidoptera), -Insects: Earwigs (Forficuliadae)				

	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
12	Karasal zehirli omurgasız hayvanlar -Böcekler: Tahtakuruları (Heteroptera) -Böcekler: Kınkanatlılar (Coleoptera) -Böcekler: Yarım kanatlılar (Hemiptera)				
	Terrestrial venomous invertebrates -Insects: Bedbugs (Heteroptera) -Insects: Coleopterans (Coleoptera) -Insects: Hemipterans (Hemiptera)				
13	Karasal zehirli omurgasız hayvanlar -Örümcekler (Araneida) -Akrepler (Scorpionidae) -Yalancı akrepler (Pseudoscorpionida)				
	Terrestrial venomous invertebrates -Spiders (Araneida) -Pseudoscorpions (Pseudoscorpionida)				
14	Karasal zehirli omurgasız hayvanlar -Çiyanlar (Chilopoda)				
	Terrestrial venomous invertebrates -Centipedes (Chilopoda)				
15	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
	Ödev ve Sunumların Rapor Edilmesi				
	Reporting homework's				
16	Teorik Dersler / Theoretical	Uygulama	Lab	Öğretim Yöntem ve Teknikleri/Teaching Methods Techniques	Ön Hazırlık / Preliminary
	Final Sınavı				
	Final exam				

DEĞERLENDİRME / EVALUATION

Yarıyıl (Yıl) İçi Etkinlikleri / Term (or Year) Learning Activities	Sayı / Number	Katkı Yüzdesi / Percentage of Contribution (%)
Ara Sınav / Midterm Examination	1	100
Toplam / Total:	1	100
Başarı Notuna Katkı Yüzdesi / Contribution to Success Grade(%):		40

Yarıyıl (Yıl) Sonu Etkinlikleri / End Of Term (or Year) Learning Activities	Sayı / Number	Katkı Yüzdesi / Percentage of Contribution (%)
Final Sınavı / Final Examination	1	100
Toplam / Total:	1	100
Başarı Notuna Katkı Yüzdesi / Contribution to Success Grade(%):		60

Etkinliklerinin Başarı Notuna Katkı Yüzdesi(%) Toplamı / Total Percentage of Contribution (%) to Success Grade:	100
Değerlendirme Tipi / Evaluation Type:	

İŞ YÜKÜ / WORKLOADS

Etkinlikler / Workloads	Sayı / Number	Süresi (Saat) / Duration (Hours)	Toplam İş Yüğü (Saat) / Total Work Load (Hour)
Ara Sınav / Midterm Examination	1	1.00	1.00
Ara Sınav İçin Bireysel Çalışma / Individual Study for Mid term Examination	1	15.00	15.00
Bireysel Çalışma / Self Study	9	6.00	54.00
Derse Katılım / Attending Lectures	14	3.00	42.00
Final Sınavı / Final Examination	1	1.00	1.00
Final Sınavı için Bireysel Çalışma / Individual Study for Final Examination	1	20.00	20.00
Makale Kritik Etme / Criticising Paper	6	10.00	60.00
Okuma / Reading	14	3.00	42.00
Rapor Hazırlama / Report Preparation	1	10.00	10.00
Rapor Sunma / Report Presentation	1	3.00	3.00
Toplam / Total:	49	72.00	248.00

Dersin AKTS Kredisi = Toplam İş Yüğü (Saat) / 30.00 (Saat/AKTS) = 248.00/30.00 = 8.27 ~ / Course ECTS Credit = Total Workload (Hour) / 30.00 (Hour / ECTS) = 248.00 / 30.00 = 8.27 ~

PROGRAM VE ÖĞRENME ÇIKTISI / PROGRAM LEARNING OUTCOMES

Öğrenme Çıktıları / Learning Outcomes	Program Çıktıları / Program						
	1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7
1.1- Hayvan zehirlerinin önemli biyolojik işlevlerini öğrenme / 1) To learn the important biological functions of animal poisons	5	4	4	4	4	4	4
2.2- Denizel zehirli omurgasız hayvanları öğrenme / 2) Learning about marine venomous invertebrates		5	5	5	5	5	
3.3- Karasal zehirli omurgasız hayvanları öğrenme / 3) Learning about terrestrial venomous invertebrates							
4.4- Zehirli omurgasız hayvanların korunmasını kavrama / 4) Understanding the importance of protecting poisonous invertebrates							
5.5-Öğrenilen bilgiler ile çevremizdeki zehirli omurgasız hayvanlarla ilgili veri tabanını araştırabilme ve temel bir izleme araştırması tasarlayabilme / 5) To design a monitoring study related to poisonous invertebrates in our environment based on the information learned		5	5	5	5	5	5

Katkı Düzeyi / Contribution Level : 1-Çok Düşük / Very low, 2-Düşük / Low, 3-Orta / Moderate, 4-Yüksek / High, 5-Çok Yüksek / Very high