

## Course Syllabus

1	Course title	Nematode Ecology	
2	Course number	0606923	
3	Credit hours	3	3
	Contact hours (theory, practical)	3	
4	Prerequisites/corequisites	/	
5	Program title	Plant Protection	
6	Program code		
7	Awarding institution		
8	School	School of Agriculture	
9	Department	Department of Plant protection	
10	Course level	PhD	
11	Year of study and semester (s)		
12	Other department (s) involved in teaching the course	/	
13	Main teaching language	English	
14	Delivery method	<input type="checkbox"/> Face to face learning <input checked="" type="checkbox"/> Blended <input type="checkbox"/> Fully online	
15	Online platforms(s)	<input type="checkbox"/> Moodle <input type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....	
16	Issuing/Revision Date	Feb. 27 <sup>th</sup> 2022	

### 17 Course Coordinator:

Name: Dr. Luma Al Banna

Contact hours: 5-7 pm Monday and Wednesday

Office number: 176

Phone number: 22530

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### 18 Other instructors:

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## 19 Course Description:

This course includes study of the distribution of nematode population, and the effects of abiotic and biotic factors on nematode populations; including soil temperature, moisture, pH in addition to gases, inorganic and organic matter contents in the soil. Nematode survival mechanisms will be also discussed.

## 20. Course aims and outcomes:

### A- Aims:

- To understand major concepts of population biology, including patterns of distribution and abundance of plant parasitic nematodes; population demography; population growth; regulation of population size, survival.
- To understand major concepts in community ecology, including patterns of biodiversity.

PLOs	1	2	3	4	5	6	7	8	9
SLOs of the course									
A1 Understand some important topics concerning ecology of nematodes.	√								
A2 Understand population and community ecology.	√								
A3 Understand the spatial and temporal distribution of nematodes.	√								
A4 Recognize how do nematode survive and spread.	√								
B1- Gain the skills of sampling nematodes	√								
C1- Derive principles of plant disease management from knowledge of nematode ecology.	√					√	√		
C2- Gain an increased self-confidence in one's personal ability regarding nematode Ecology		√				√			
C3- Gain an increased self-confidence in one's personal ability regarding ecology as a science.						√	√		√
D1 Work within a team		√					√		√
D2. Plan and manage time		√							√

PLOS :After the successful completion of this program student should be able to:

1. Demonstrate a broad knowledge of core concepts in plant protection.
2. Demonstrate teaching competence through teaching assistance, seminars and speaking experiences.
3. Understanding, interpretation and synthesis of scientific literature pertaining to plant protection.
4. Formulate hypotheses; develop experimental designs to test these hypotheses; establish and maintain experiments.
5. Collect data in an objective way and perform appropriate statistical analyses.
6. Think critically, solve research problems, and draw conclusions in the field of specialization.
7. Interpret and present research results in oral and written formats.
8. Publish research in peer-reviewed scientific journals.
9. Maintain a leadership role in plant protection at the national and international levels.

## 21 Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods	Platform	Synchronous / Asynchronous / Lecturing	Evaluation Methods	Resources
1	1.1	<b>I. Introduction</b> : Plant Parasitic Nematode ; Biology	A1	Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	1-3
	1.2	<b>I. Introduction</b> : Plant Parasitic Nematode ; Biology	A1	Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	1-4
	1.3	<b>A. Distribution of Nematodes</b>				Asynchronous		
2	2.1	<b>II. Population Ecology</b> <b>A. Distribution of Nematodes</b> 1. Geographical 2. Local ( vertical, horizontal, temporal)	A1-A4, B1, C1-C3, D1-D2	Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	1-4,14
	2.2	<b>B. Distribution of Nematodes</b> 1. Geographical 2. Local ( vertical, horizontal, temporal)		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	1-4,14
	2.3	<b>B. Population Dynamics</b>				Asynchronous		
3	3.1	<b>B. Population Dynamics</b>		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	1-4
	3.2	<b>B. Population Dynamics</b>		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	
	3.3	<b>C. Influence of physical factors</b>				Asynchronous		
4	4.1	<b>C. Biotic and Abiotic factors affecting populations.</b> 1. Influence of physical factors		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	1-4,10-13,15
	4.2	<b>C. Biotic and Abiotic factors affecting populations.</b> 1. Influence of physical		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	

		factors						
	4.3	<b>Abiotic factors</b>				Asynchronous		
5	5.1	<b>C.Biotic and Abiotic factors affecting populations.</b> 1.Influence of physical factors		Face to Face	Moodle, Microsoft teams	Synchronous	Presentation	
	5.2	<b>C.Biotic and Abiotic factors affecting populations.</b> 1.Influence of physical factors		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final Presentation	
	5.3	Influence of chemical factors		Blended		ASynchronous		1-4, 16,16-17
6	6.1	<b>C.Biotic and Abiotic factors affecting populations.</b> 2.Influence of chemical factors		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	
	6.2	<b>C.Biotic and Abiotic factors affecting populations.</b> 2.Influence of chemical factors		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final	
	6.3	<b>Biological factors</b>				Asynchronous		1-4,7
7	7.1	<b>C.Biotic and Abiotic factors affecting populations.</b> 3.Influence of biological factors		Face to Face	Moodle, Microsoft teams	synchronous	Mid & final Mid & final, Presentation	
	7.2	<b>C.Biotic and Abiotic factors affecting populations.</b> 3.Influence of biological factors		Face to Face	Moodle, Microsoft teams	Synchronous		
	7.3	Influence of biological factors				Asynchronous		
8	8.1	<b>C.Biotic and Abiotic factors affecting populations.</b> 3.Influence of biological factors		Face to Face	Moodle, Microsoft teams	Synchronous	Mid & final, Presentation	
	8.2							

	8.3	<b>C.Biotic and Abiotic factors affecting populations.</b> <b>3.Influence of biological factors</b>		Face to Face	Moodle, Microsof t teams	Asynchronous		
9	9.1	<b>D. Survival senescence, quiescence, cryptobiosis</b>		Face to Face	Moodle, Microsof t teams	Synchronous	Final	1-3, 9,18
	9.2	<b>D. Survival senescence, quiescence, cryptobiosis</b>		Face to Face	Moodle, Microsof t teams	Synchronous	Final	
	9.3	<b>Survival</b>				Asynchronous		
10	10.1	Midterm						
	10.2	<b>III. Community Ecology</b> A. Populations and Communities B. Habitats	A1-A3 , C1-C3, D1-D2	Face to Face		Synchronou		1-4,5,19
	10.3	<b>Nematode structure</b>				Asynchronous		
11	11.1	<b>C. Trophic groups</b>		Face to Face		Synchronous	Final	
	11.2	<b>D. Structure</b> <b>E. Diversity</b>	Face to Face	Moodle, Microso ft teams	Synchronous	Final		
		<b>Diversity</b>			Asynchronous			
12	12.1	<b>D. Structure</b> <b>E. Diversity</b>		Face to Face	Moodle, Microso ft teams	Synchronous	Final	
	12.2	<b>D. Structure</b> <b>E. Diversity</b>		Face to Face		Synchronous	Final	
		<b>Students project</b>				Asynchronous		
13	13.1	<b>Students projects</b> Ecology of <i>Bursaphelenchus xylophilus</i>	A1-A4 , B1, C1- C3, D1- D2	Face to Face		Synchronous	Final	
	13.2	<b>Students projects</b> Ecology of <i>Belonolaimus longicaudatua</i>		Face to Face		Synchronous	Final	
	13.3	<b>Student project</b>				Asynchronous	Final	



14	14.1	<b>Students projects</b> Ecology of Pine wilt nematode			Moodle, Microsoft teams	Synchronous	Final	
	14.2	Ecology of <i>Ditylenchus dipsaci</i>			Moodle, Microsoft teams	Synchronous	Final	
		Student Projects				Asynchronous		
15	15.1	<b>Students projects</b> Ecology of <i>Pratylenchus penetrans</i>		Face to Face		Synchronous	Project , Students	
	15.2	<b>Students projects</b> Ecology <i>Heterodera latipons</i>		Face to Face		Synchronous	Project students	

## 22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
First Mid-Term Exam (Theory and practical)	30	W1-W9	A1-C1, D2	<b>10<sup>th</sup> week</b>	
Presentation, Assignments	10 5	W3-W14	A1-D2	At the end of each topic	Moodle, Microsoft teams
Final project	15				
Final Exam (theory and practical)	40%	W1-W15all topics	A1-C1, D2	Will be announced from registrar	

## 23 Course Requirements

(e.g: students should have a computer, internet connection, webcam,

## 24 Course Policies:



- A- Attendance policies:  
**<15% , <20% with a permission ; medical report**
- B- Absences from exams and submitting assignments on time:
- **Assignments will not be accepted after deadline**
  - **Absence of exams with a medical report must be submitted following regulations and a makeup exam will be scheduled within one week**
- C- Health and safety procedures:
- **Mask must be worn all the time in class and lab**
  - **Social distancing**
- D- Honesty policy regarding cheating, plagiarism, misbehavior:
- E- Grading policy:

From (%)	To (%)	Scale	Mark	Result
0	54	0	C	Acceptable
55	59	2.5	C+	Good
60	64	2.75	B-	Good
65	74	3	B	Very Good
75	79	3.5	B+	Very Good
80	84	3.75	A <sup>-</sup>	Excellent
85	100	4	A	Excellent

F- Available university services that support achievement in the course:

## 25 References:

A- Required book(s), assigned reading and audio-visuals:

### Text Book :

1. **Neher DA.** 2010. Ecology of plant and free-living nematodes in natural and agricultural soil. Annu Rev Phytopathol. 48:371-94. doi: 10.1146/annurev-phyto-073009-114439. PMID: 20455699.
2. **Norton, D. 1991.** Biology and Ecology of nematodes 47-72 In Manual of Agricultural Nematology. Nickle ed. Dekker
3. **Norton, D.C. 1978.** Ecology of Plant-Parasitic Nematodes. 268pp.

### References

4. **Abed, A.,** 2002. Epidemiology of *Heterodera latipons*. PhDthesis
5. **Al-Banna, L., and S. L. Gardner.** 1996. Nematode diversity of native species of *Vitis* in California. Canadian Journal of Zoology: 74:971-982.
6. **Al-Banna, L., R. Darwish and T. Aburjai..** 2003. Effect of plant extracts and essential oils on root-knot nematode. Phytopathologia Mediterranea: 42: 123-128.
7. **Al-Banna, L., and Khyami-Horani.** 2004. Nematicidal activity of two Jordanian strains of *Bacillus thuringiensis* on root-knot nematodes. Nematologia Mediterranea, 32: 41-45.
8. **Cuartero, J., Frey, B., Eder, R., Brunner, I.** 2024. More than a decade of irrigation alters soil nematode communities in a drought-prone Scots pine forest, Applied Soil Ecology, 203, 105621, ISSN 0929-1393, <https://doi.org/10.1016/j.apsoil.2024.105621>.
9. **Halik, S. and Bergdahl, D. B. 1992.** Survival and ifectivity of *Bursaphelenchus xylophilus* in wood chip-soil mixtures. Journal of Nematology 24: 495- 503



10. **Kodira, C. U. and Ferris, H.** 1992. Effects of temperature on *Pratylenchus neglectus* and on its pathogenicity to Barley. *Journal of nematology*, 24: 504-511.
11. **Koenning, S. R. Walters S. A. and Barker, K. R.** 1996. Impact of soil texture on the reproduction and damage potentials of *Rotylenchulus reniformis* and *Meloidogyne incognita* on cotton. *Journal of nematology* 28: 527-536.
12. **Lyons, J. M. Keith, A. D. & Thomason, I. J.** 1974. Temperature-Induced phase transitions in nematode lipids and their influences on respiration. *Journal of Nematology*, 7: 98-103.
13. **Mizukubo, T. & Adachi, H.** 1997. Effect of temperature on *Pratylenchus penetrans* development. *Journal of Nematology*, 29: 306-314.
14. **Pen Mouratov S Rakhimbaev M Steinberger Y.** 2003. Seasonal and spatial variation in nematode communities in a Negev Desert ecosystem. *Journal of Nematology*. 35:157-166
15. **Ploeg, A.** 1992. Influence of temperature on multiplication and egg hatching of *Longidorus africanus*. *Journal of Nematology*, 31: 75-80.
16. **Spiegel Y Burrows P M Bar Eyal M.** 2003. A chemo attractant in onion root exudates recognized by *Ditylenchus dipsaci* in laboratory bioassay. *Phytopathology*. 93: 127-132
17. **Stoner, N., Nagle, K., Rivera, M., VanSant, L. and Schroeder.** The effects of sodium chloride on embryonic development and egg hatch of the southern root knot nematode, *Meloidogyne incognita*. DUPONT Crop Protection Products- Nematology, Newark, DE 19714, USA.
18. Treonis, A. and Wall, D. 2005. Soil nematodes and desiccation survival in the extreme arid environment of the antarctic dry valleys. *Integrated comparative Biology*, 45: 741-750.
19. **Yeates, G.W., Bongers, T., DeGoede, R.G.M., Freckman, D.W., & Georgieva, S.S., 1993.** Feeding habits in soil nematode families and genera-An outline for soil ecologists. *J. Nematol.* 25, 315-331.

Appropriate Scientific papers, modified regularly

**Reference updated each semester**

Videos In class and will be deposited on elearning

Highlighted papers are Students presentations

Students Projects\* : modified regularly

## 26 Additional information:

Name of Course Coordinator: -----Signature: ----- Date: -----
Head of Curriculum Committee/Department: ----- Signature: -----
Head of Department: ----- Signature: -----
Head of Curriculum Committee/Faculty: ----- Signature: -----
Dean: ----- Signature: -----