مركز الاعتماد وضمان الجودة

Course Syllabus

1	**Course title**	Weed Ecophysiology
2	**Course number**	**606972**
3	**Credit hours**	3
	Contact hours (theory, practical)	3
4	**Prerequisites/corequisites**	Weed Science 646231
5	**Program title**	Ph.D. In Plant protection
6	**Program code**	
7	**Awarding institution**	
8	**School**	School of Agriculture
9	**Department**	Department of Plant Protection
10	**Level of course**	Ph.D.
11	**Year of study and semester (s)**	2024/2025 1st semester
12	**Other department (s) involved in teaching the course**	
13	**Main teaching language**	English
14	**Delivery method**	X Face to face learning ☐Blended ☐Fully online
15	**Online platforms(s)**	☐Moodle ☐Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	Dec. 10th 2024

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17. Course Coordinator

Name: Dr. Wisam M. Obeidat Office hours: Office number: 187 Phone number: 22518 Email: wi.obeidat@ju.edu.jo

18. Other instructors:

Name: Office number: Phone number: Email: Contact hours:

19 Course Description:

This course covers weed biology, including means of propagation and dissemination, ecological adaptation emphasizing weediness and persistence, various weed interferences, development of resistance to herbicides, comparative ecophysiology, and genetics of weeds and crops. The course includes some literature studies and presentations of research papers that the lecturer found it feasible.

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20 Course aims and outcomes:

A- Aims:

At the end of the course, the students should know:

- Be able to identify & categorize weeds according to different classification methods, which enable students to know better these species and their role in human and animal health.
- Know the role of different ecological factors on growth and productivity of weeds and their response to agricultural practices and changes occur in their environment.
- Able to predict future weed infestation and plant weed control programs.
- Able to calculate losses caused by weed and calculate the cost of weed control and economic feasibility of their control.
- Know on weed evolution and weed strategies. Weed dominance under different environmental conditions and type of vegetation in such ecological regions.

B- Student Learning Outcomes (SLOs): Upon successful completion of this course student will be able to:

A. Knowledge and Understanding:

Students are expected to gain knowledge in the following aspects:

A1- Know about weed ecological classification

A2- Know weed evolutionary stages and importance

A3- Role of environmental factors on weed productivity and success in the environment

A4- Understand the genetic relationship between weeds and cultivated crops and the reflection of this on weed succession, evolution and dominance

A5- Learn how to predict weed population and future infestation and how to plant successful weed control programs.

A6- Study methods of study weed competition and estimation of crop yield losses

A7- Study the role and influence of different growth factors on the interrelationship between weeds and crops and the influence of competition over these factors on physiological processes and responses of competing species.

A8- Know about all kinds of interrelationships between weeds and crop plants including positive and negative interactions.

B. Intellectual Analytical and Cognitive Skills: Student is expected to:

B1- Keep up to date with any progress in weed research and recent developments in weed evolution and reaction with ecology and environment methods and herbicides.

B2- Consult recent published papers or references on the subject

B3- Interact with the lecturer and discuss any important related issues students think that introduce new knowledge or satisfy student quires on the topic.

B4- Become familiar with weeds, their ecology, physiology and differences between these and crop plants. The role of ecophysiological factors on weed succession and evolution.

B5- How knowledge on weed ecophysiological factors can help in their management in the field and in different growing systems

C. Subject-Specific Skills: Students are expected to:

C1- Predict future weed infestation

C2- Plan weed control programs

C3- Learn about the ecophysiological interrelationships between weeds and crop plants

C4- Gain knowledge on all kinds of weed crop interactions including positive and negative interactions

C5- Gain knowledge on weed dominance in different ecological regions and environments

C6- Know on weed physiological responses in relation to ecological factors

C7- Gain knowledge on weed evolutionary success and genetics

D. Transferable Key Skills: Students are expected to:

D1- How to distinguish weed species based on their ecological and physiological factors,
D2-How to predict weed infestation, how to design weed\crop competition studies,
D3- How to distinguish different groups of weeds based on their habitats and succession stages,
D4- How to get familiar with growth patterns, seed and other propagules production, dispersal, and importance in the maintenance of species under stress conditions,
D5- How to calculate losses caused by weeds and manage them,
D6- How to use physiological and ecological calculations/equations/terminology and adopt them to weed situations.
D7- Know the importance of growth factors and their effects on the outcome of competition and analyze factors affecting the relationship between weeds and crop plants.

PLOs / SLOs of the course	1	2	3	4	5	6	7	8	9	10	11
A1- Know about weed ecological classification	√				√						
A2- Know weed evolutionary stages and importance	√			√	√	√					
A3- Role of environmental factors on weed productivity and success in the environment		√	√	√	√	√					
A4- Understand the genetic relationship between weeds and cultivated crops and the reflection of this on weed succession, evolution and dominance		√	√	√	√	√	√			√	√
A5- Learn how to predict weed population and future infestation and how to plant successful weed control programs.		√	√	√	√	√					
A6- Study methods of study weed competition and estimation of crop yield losses				√	√	√					
A7- Study the role and influence of different growth factors on the interrelationship between weeds and crops and the influence of competition over these factors on physiological processes and responses of competing species.		√	√	√	√		√				√
A8- Know about all kinds of interrelationships between weeds and crop plants including positive and negative interactions	√	√	√	√	√	√	√	√	√	√	√
B1- Keep up to date with any progress in weed research and recent developments in weed evolution and reaction with ecology and environment methods and herbicides.		√		√			√	√			
B2- Consult recent published papers or references on the subject		√	√			√		√			√
B3- Interact with the lecturer and discuss any important related issues students think that introduce new knowledge or satisfy student quires on the topic.	√	√	√	√	√	√	√	√	√	√	√

B4- Become familiar with weeds, their ecology, physiology and differences between these and crop plants. The role of ecophysiological factors on weed succession and evolution.	√	√	√	√	√	√	√	√	√	√	√
B5- How knowledge on weed ecophysiological factors can help in their management in the field and in different growing systems	√				√						√
C1- Predict future weed infestation	√				√		√				
C2- Plan weed control programs	√	√	√	√			√				
C3- Learn about the ecophysiological interrelationships between weeds and crop plants	√	√	√	√	√	√	√	√	√	√	√
C4- Gain knowledge on all kinds of weed crop interactions including positive and negative interactions		√	√	√	√	√	√	√			√
C5- Gain knowledge on weed dominance in different ecological regions and environments	√	√		√		√				√	
C6- Know on weed physiological responses in relation to ecological factors	√	√	√	√	√	√	√	√	√	√	√
C7- Gain knowledge on weed evolutionary success and genetics	√	√	√	√	√	√	√	√	√	√	√
D1- How to distinguish weed species based on their ecological and physiological factors		√	√	√	√	√	√	√			
D2-How to predict weed infestation, how to design weed\crop competition studies,	√		√		√		√				
D3- How to distinguish different groups of weeds based on their habitats and succession stages,	√						√	√			
D4- How to get familiar with growth patterns, seed and other propagules production, dispersal, and importance in the maintenance of species under stress conditions	√	√	√	√	√	√	√	√	√	√	√
D5- How to calculate losses caused by weeds and manage them				√	√	√	√	√			
D6- How to use physiological and ecological calculations/equations/terminology and adopt them to weed situations.	√	√	√	√		√			√		
D7- Know the importance of growth factors and their effects on the outcome of competition and analyze factors affecting the relationship between weeds and crop plants		√	√	√						√	√

Upon the successful completion of this program (PLOs) students should be able to:

1. Demonstrate a broad depth knowledge of core concepts in plant protection.
2. Exhibit teaching competence through teaching, seminars and speaking experiences.
3. Interpret scientific literature related to Plant pathology, Entomology, or Weed science.
4. Formulate hypotheses, and develop experimental designs to test these hypotheses.
5. Establish and maintain experiments in the field of Plant Pathology, Entomology, or Weed science.
6. Perform appropriate statistical analyses for data collected in in Plant Pathology, Entomology, and Weed science.
7. Think critically, solve research problems, and draw conclusions in the field of Plant Pathology, Entomology, or Weed science
8. Interpret and present research results in both oral and written formats.
9. Publish research in the field of Plant Protection in peer-reviewed scientific journals.
10. Maintain a leadership role in Plant Protection at the national and international levels.
11. Commit to ethics and compliance responsibilities for being an agricultural engineer, especially with regard to agricultural sector, environment, and society.

21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods Face to Face (FF) Blended (B) Fully Online (FO)	Platform MS teams (MS) Moodle (M))	Lecturing Synchronous (S) Asynchronous (AS)	Evaluation Methods Assignment (A) Exam (E) Presentation (P) Quiz (Q) Report (R)	Resources
1	1.1	Introduction Characteristics of weeds		FF	MS	S	E	15, 21, 22
	1.2	Introduction Characteristics of weeds		FF	MS	S	E	15, 21, 22
2	2.1	Worldwide distribution and importance of weeds Crop mimics		FF	MS	S	E	15, 21
	2.2			FF	MS	S	E	15, 21
3	3.1	Classification of weeds by History Adaptation Ecology Negative and positive effects of agrestal weeds Characteristics of agrestals.		FF	MS	S	E	16, 21, 22
	3.2			FF	MS	S	E	16, 21, 22
4	4.1	Environment Vegetation Community differentiation Weeds: Domesticates and wild		FF	MS	S	E	12, 22
	4.2			FF	MS	S	E	12, 22

		plants Patterns of evolutionary development R and k selection C, S and R selection Weeds as strategies						
5	5.1	Competitive ruderals Stress tolerant Reproduction Sexual reproduction Influence of polyploidy, weeds/crops relations		FF	MS	S	E	14, 22
	5.2			FF	MS	S	E	14, 22
6	6.1	Vegetative reproduction • Bud reserve • Occurrence of vegetative propagation • Advantage of vegetative reproduction		FF	MS	S	E	8,14,16, 22
	6.2			FF	MS	S	E	8,14,16, 22
7	7.1	Dispersal in space in time Germination and establishment Light requirement Soil seed reserve (seed bank) Seed longevity and mortality\ Seed longevity and impact on cropping systems • Patterns of emergence • Safe site concept and risk of death		FF	MS	S	E	9, 11, 12, 22
	7.1			FF	MS	S	E	9, 11, 12, 22

8	8.1	**Midterm Exam**						
	8.2	Prediction of weed infestation plant growth and interference definition Negative interference Space and resources Type of neighbors Competition versus other types of interference Competition Definition Competition and density Effect of density on growth Effect of density on mortality and reproduction		FF	MS	S	E	14,16, 22, 24
9	9.1	Prediction of weed infestation plant growth and interference definition Negative interference Space and resources Type of neighbors Competition versus other types of interference Competition Definition Competition and density Effect of density on growth Effect of density on mortality and reproduction		FF	MS	S	E	14,16, 22, 24
	9.2			FF	MS	S	E	14,16, 22, 24

10	10.1	Prediction of weed infestation plant growth and interference definition Negative interference Space and resources Type of neighbors Competition versus other types of interference Competition Definition Competition and density Effect of density on growth Effect of density on mortality and reproduction		FF	MS	S	E	14,16, 22, 24
	10.2	Method of studying competition Additive design Substitutive design Systematic design Measurement of competition Aggressivity Competition index Relative Competitive ability index		FF	MS	S	E	22
11	11.1	Method of studying competition Additive design Substitutive design Systematic design Measurement of competition Aggressivity Competition index Relative Competitive ability		FF	MS	S	E	22

		index						
	11.2	Critical period of competition Inter- and intra-specific competition Predicting crop loss form competition		FF	MS	S	E	9, 21, 22
12	12.1	Amensalism Definition Effect of allelopathy Techniques in studying allelopathy		FF	MS	S	E	1, 17, 21, 23
	12.2	Parasitism Adaptation for dispersal and germination Physiology of parasitism Commensalisms Proto-cooperation Mutualism		FF	MS	S	E	19, 21
13	13.1	Limiting factors and competition Light Water and water use efficiency CO_2 Root function and competition Plant factors and competition		FF	MS	S	E	9, 11, 12 , 13
	13.2	Competition for nutrients interaction of nutrients with other resources and plant density response to high levels of nutrients		FF	MS	S	E	9, 11, 12 , 13, 22

		response to low levels of nutrients						
14	14.1	Plant growth analysis Weed/crop dynamics and management		FF	MS	S	E	16, 22
	14.2	Impact of herbicides Herbicide resistance and weed evolution		FF	MS	S	E	6, 9, 10, 18, 20, 21
Final Exam based on university schedule								

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22. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:
Learning through lectures, field trips, practical part of this course and laboratory work, weed samples collection, slides on weed species in farm land and natural habitats, literature review, all weed species samples and information on each species are displayed in the laboratory.

23. Evaluation Methods and Course Requirements:

Homework, Quiz, Exam, presentation, term paper…etc
Each student is required to submit a review term paper on recent advances in weed ecophysiologcal aspects at the end of the semester.

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

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Mid. Term Exam (end of modules 1)	30		8-9th week	
Students Presentations (2 presentations)	8			
In class work	5			
Term paper	17			
Final Exam (theoretical and practical)	40		As scheduled by the university	

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	Fail
55	59	2.5	C+	Good
60	64	2.75	B-	Very Good
65	74	3	B	Very Good
75	79	3.5	B+	Very Good
80	85	3.75	A^-	Excellent
86	100	4	A	Excellent

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

25. Required equipment: (Facilities, Tools, Labs, Training….)

Class room equipped with Smart board and computer, Teaching Lab with fresh and dry samples of weeds, sprayers and calibration tools.

26. References:

Main Reference/s:

ALL below collectively

Fitter, A.H. and Hay, R.K.M. (1983). *Environmental Physiology of Plants.* Academic Press, London.

Duke, S.O. (1987). *Weed Physiology*. Vol. 1 & 2. CRC Press Inc. Boca Raton, Florida

Radosevich, S., Holt, J. and Ghersa, C. (1997). *Weed Ecology: Implication for Management* .2nd Edition. John Wiley & Sons Inc. New York.

Grime, J.P. (1986). *Plant Strategies and Vegetation Processes*. John Wiley and Sons, Chichester, England.

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1. Ahshapanek, D.C. (1962). *Ecological Studies on Plant Inhibition by* Solanum rostratum. Ph.D. Dissertation, University of Oklahoma, Norman.
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4. Bridges, D.C. (1995). Ecology of Weeds. In: *Handbook of Weed Management Systems*, ed. A.E. Smith. Marcel Dekker, New York, pp. 19-34.
5. Buhler, D.D. (ed.). (1999). *Expanding the Context of Weed Management*. The Haworth Press Inc. New York.
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9. Duke, S.O. (1987). *Weed Physiology*. Vol. 1 & 2. CRC Press Inc. Boca Raton, Florida.
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11. Egley, G.H. and Duke, S.O. (1985). Physiology of weed seed dormancy and germination. Pages 28-64 In: *Weed Physiology*, ed. S.O. Duke, CRC Press, Boca Raton, Florida.
12. Fitter, A.H. and Hay, R.K.M. (1983). *Environmental Physiology of Plants.* Academic Press, London.
13. Grace, J.B. and Tilman, D. (eds.) (1990). *Perspectives on Plant Competition*. Academic Press Inc. London.
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17. Inderjit, Dakshini, K.M.M. and Foy, C. L. (eds.). (1999). *Principles and Practices in Plant Ecology*. *Allelochemical Interaction*. CRC Press LLC. London.
18. LeBaron, H.M. and Gressel, J. (eds.). (1982). *Herbicide Resistance in Plants*. John Wiley & Sons. New York, USA.
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20. Powles, S.B. and Holtum, J.A.M. (eds.). (1994). *Herbicide Resistance in Plants. Biology and Biochemistry*. Lewis Publishers, Boca Raton, Florida.
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25. Van Rign, P.J. (2000). *Weed Management in Humid and Sub-Humid Tropics*. Royal Tropical Institute, KIT Press, Amesterdam.

27. Additional information:

Websites to be announced during the course

Name of Course Coordinator: Dr. Wisam Obeidat- Signature: ---------- Date: December 23, 2024
Head of Curriculum Committee/Department: ---------- Signature: ----------

Head of Department: Prof. Nida' Salem---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------