Basic Information	
Course Code	
Course Title	Field diagnosis of insect damage
Academic Year	2022/2023
Academic Program	New Professional Diploma in Plant Clinic and Phytosanitary Technologies
Hours/week semester	Lectures: 2 Practical: 2 total: 3

Course Description: Detection the damage in agricultural crops due to the attack of insect pests is still a challenging task, especially for farmers. This course will cover the basic principles to accurate identification of insect pests causing economic damage in agricultural crops based on the symptoms of infestation expressed by the infested plants. Students will be introduced to topics including monitoring and forecasting methods, identifying the weak points in the life cycle of insect pests and utilizing the economic and eco-friendly techniques for pest management in a compatible approach in order to maintain the pest population below a level causing economic injury.

1. Course Aims

1.1- Understand the concept of economic threshold and economic injury level
1.2- Know the nature of damage due to insect infestations
1.3- Recognize the seasonal incidence of insect pests that cause loss to major field crops
1.4- Understand the reasons for their outbreak resulting in crop loss
1.5- Aware with the common diagnostic methods of insect damage
1.6- Follow the methods used for inspection of the insect pest damaged crops correctly
1.7- Describe the type of damage and estimate the yield loss
1.8- Understand the procedures of the crop biological disaster forecasting
1.9- Utilize the economic and ecofriendly techniques for pest control and IPM programs

2. Intended Learning Outcomes

2.1. Knowledge and Understanding

On successful completion of this course, the student should be able to

2.1.1- Define the economic thresholds and economic injury level of insect pests
2.1.2- Mention the different species of insect pests attacking main agricultural crops
2.1.3- Understand the development, feeding habits and life cycle of main insect pests
2.1.4- Recognize how to identify symptoms and damage due to the insect infestations
2.1.5- Know how to estimate the economic loss of crop yield due to insect infestation
2.1.6- Aware of modern approaches towards monitoring and forecasting of insect pests
2.1.7- Know the basic principles of integrated management

2.2. Intellectual Skills

By the end of this course, the student should be able to

2.2.1- Determine the biotic and abiotic factors affecting the severity level of insect pests
2.2.2- Compute the economic injury level and economic threshold of insect pest on different agricultural crops

2.2.3- Evaluate the methods used for monitoring and forecasting used for early detection of insect pest infestation

2.2.4- Describe the sign of infestation due to insect pests on various crops

2.2.5- Express in brief the estimated yield loss caused by insect infestation

2.2.6- Think in the problem of insect infestation, yield loss and find the proper solution

2.2.7- Use collected data on the biology and life cycles of the insect pests to combat them

2.2.8- Decide the required measurements in response to unexpected problems before taking action against insect pests

2.3. Practical and Professional Skills

By the end of this course, the student should be able to

2.3.1- Collect sampling, labeling and preservation of insect infestation samples

2.3.2- Perform modern field techniques to estimate the infestation rate of insect pests on different agricultural crops

2.3.3- Diagnose the symptoms of infestation and damage caused by various insect pests

2.3.4- Conduct laboratory investigations for detection of hidden insect infestations

2.3.5- Develop modern techniques for monitoring and forecasting insect infestation

2.3.6- Design management programs to maintain infestation below the economic threshold

2.3.7- Evaluate the advantages and disadvantages of different control methods

2.4. General and Transferable Skills

By the end of this course, the student should be able to

2.4.1- Communicate of entomological information to the scientific community and public

2.4.2- Able to be self-motivated learners and responsive to feedback

2.4.3- Think independently, and solve problems on scientific basis

2.4.4- Works in team and small groups (*i.e.,* sharing, discussions and solving problems)

2.4.5- Use internet applications to develop his professional skills

Course content

Topics	Total (hr)	Lectures (hr)	Practical (hr)
Introduction and course overview, concept of natural balance in agro-ecosystem	3	2	2
Population dynamics of insect pests and parameters that affect the rate of their population growth	3	2	2
Types of insect pests according to the concept of economic injury level and economic threshold and factors causes outbreak of pests	3	2	2
Basic principles and methods for monitoring and forecasting of insect pest population	3	2	2
Monitoring plant infestation using soft computing and image processing techniques	3	2	2
Expert systems for early detection the insect pest problems and severity of damage caused by insect pests on agricultural crops	3	2	2
Classification of insect pests based on the damage	3	2	2

with special reference to the parts of plants they damage			
Identification of damage and estimation of rate of infestation and crop losses caused by insect pests on various agricultural crops	3	2	2
Methods of field diagnosis and detection of various insect pest infestations on various agricultural crops	3	2	2
Methods of insect pests sampling and evaluating pest damage extent by insect counting	3	2	2
Scouting techniques for soil-inhabiting insect pests	3	2	2
Methods of detection and diagnose hidden infestations caused by insect borers in field and laboratory	3	2	2
Methods of detection and diagnose the infestation of stored product insects in store	3	2	2
Concepts, principles and tools of IPM introduce in order to maintain insect pest population below its economic injury level	3	2	2
Total	42	28	28

Course Matrix for Achievement of Intended Learning Outcomes

	Topics	Hours	K & U									I S									P & P S							G & T S			
			1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4
1																														
2																														
3																														
4																														
5																														
6																														

4. Teaching and Learning Methods	
Lectures:	Interactive lectures through: • Teaching lectures to gain knowledge and understanding skills • Seminars • Group discussions
Practical sessions:	• Laboratory lessons (Practical sessions) to gain practical skills • Field visits
Self-Learning activities:	• Assays and reporting in different topics • Analyze the results and reach specific conclusion • Sample collection, preservation, examination and identification

5. Teaching and Learning Methods for Students of Limited Capabilities

- Additional revisions for previously taught and difficult topics
- Providing a summary for previous chapter at the end of each one
- Following up student feedbacks

6. Student Assessment

Intended Learning Outcomes Covered

6.1. Methods	KU	IS	PPS	GTS
Written exams	2.1.1/2.1.2/2.1.3/2.1.4/2.1.5/2.1.5/2.1.6/2.1.7	2.2.1/2.2.2/2.2.3/2.2.4/2.2.5/2.2.6/2.2.7/2.2.8		
Practical exams			2.3.1/2.3.2/2.3.3/2.3.4/2.3.5/2.3.6/2.3.7	
Oral exams		2.2.1/2.2.2/2.2.3/2.2.4/2.2.5/2.2.6/2.2.7/2.2.8		2.4.1/2.4.2/2.4.3/2.4.4/2.4.5
Student activities				2.4.1/2.4.2/2.4.3/2.4.4/2.4.5

KU, knowledge and understanding; IS, intellectual skills; PPS, practical and professional skills; GTS, general and transferable skills

6.2. Exam Description

Written exams	• Short essays • Drawing • Multiple choice questions • Comparisons • Giving the scientific term/information • Reasons for what comes
Practical exams	• Slideshow exams • Practical case studies • Exams on plants of the faculty farm
Oral exams	• The exam committee involves at least 3 examiners • Each evaluates the student by giving a separate score • The scores are then averaged • The student randomly selects question cards
Student activities	• Self-learning activities are evaluated throughout the semester

	6.3. Assessment Schedule	6.4. Weighing of Assessments
Exams and activities	Week (in each semester)	**Total (%)**
Semester work exam	4th, 8th and 12th	10
Student activities	Throughout the semester	10
Final written exam	16th	50
Final Practical exam	16th	20
Final oral exam	16th	10

Total	100

7. List of References

7.1. Course Notes

Course notes will be given at the beginning of each lecture

7.2. Essential Books

1- Clark, L. R., Geier, P. W., Hughes, R. D., & Morris, R. F. (1967). The ecology of insect populations in theory and practice. The ecology of insect populations in theory and practice.
2- Robert E. Pfadt (1985). Fundamentals of applied entomology (Edn 4). MacMillan Pub Co ISBN
3- D. Dent (2000) Insect Pest Management. Oxford University Press US (CABI Publishing); ISBN.
4- Barbosa, P., & Schultz, J. C. (1987). Insect outbreaks. Academic Press, Inc..
5- Pedigo, L. P., & Buntin, G. D. (Eds.). (1993). Handbook of sampling methods for arthropods in agriculture. CRC Press.
6-

7.3. Recommended Books

1- Fenemore, P. G. (2006). Applied entomology. New Age International.
2- Pedigo, L. P., Rice, M. E., & Krell, R. K. (2021). Entomology and pest management. Waveland Press.
1- Dent, D., & Binks, R. H. (2020). Insect pest management. Cabi.Wylie, F. R., & Speight, M. R. (2012). Insect pests in tropical forestry. CABI.
2- Horowitz, A. R., & Ishaaya, I. (2004). Insect pest management: field and protected crops. Springer Science & Business Media.

7.4. Periodicals, websites, ….. etc.

- Journal of Economic Entomology
- Journal of Integrated Pest Management
- Pest Management Science
- Introduction to Insect Pest Management
- Environmental Entomology

Course coordinator:

Prof. Dr. Mohamed A. M. Osman

Head of Department:

Prof. Dr.