

FUNDAMENTALS OF PLANT-PEST MANAGEMENT

IPM 3022

SPRING 2019

Credits: 3

Instructor: Dr. Silvana Paula-Moraes
 West of Florida Research and Education Center
 Entomology & Nematology Department/IFAS
 University of Florida
 4253 Experiment Dr., Hwy. 182
 Jay, FL 32565
 TEL: 850-981-7101
paula.moraes@ufl.edu

Ms. Binita Shrestha
 Citrus Research and Education Center
 Entomology & Nematology Department/IFAS
 University of Florida
 700 Experiment Station Rd
 Lake Alfred, FL, 33850.
 Tel: 405-762-0773
[email: b.shrestha@ufl.edu](mailto:b.shrestha@ufl.edu)

Office hours: The student should always contact the instructor or the TA by canvas, always copying both in the message. Meeting by zoom can be scheduled if the student needs to discuss a specific topic with the instructor or TA. The student must turn on the notification system in his/her canvas in order to receive real time alerts about the course. The student should check the announcement section in canvas, at least once a day to keep informed about the course.

Description and Objectives. This course will examine the fundamental concepts, philosophies, strategies, and tactics to manage pest populations. Terms, history, and an overview of pest groups will be presented. Ecological principles and the value of biodiversity in agroecosystems will be examined. Sampling strategies, decision-making criteria, management tactics, area-wide pest management, and insect resistance management will be discussed. Examples of specific cases of pest management in plant production systems will be presented. Videos and readings will provide more in-depth information for responding to questions on exams. Assignments will synthesize information in the lectures and assigned readings and review information available on the Internet. Discussion sessions will allow students to share opinions, perspectives, and experiences about specific topics.

In this course, the overall learning objectives are:

1. Principles of insect ecology related with pest management;
2. Historical events of pest control and the concept of Integrated Pest Management (IPM);
3. The concepts of pest injury, pest economic damage, kinds of pests, and management decisions based on pest economic levels;
4. The importance of how to survey and sampling of pests;
5. Tactics and strategies in pest management: their function and limitations
6. The principles of Insect Resistance Management (IRM) and area-wide pest management;
7. Examples of successful implementation of IPM.

The course is comprised of 14 modules. Each module has 1-5 narrated PowerPoint presentations (**PPTs**) that are 5-30-minute lectures. All presentations and other course materials (except the textbook) and activities are available on UF e-Learning and managed using the Canvas online course management system. The lecture presentations of each module should be viewed weekly in order to complete all exams and assignments in a timely fashion and participate in the discussions.

TEXTBOOK READING must be read during the same week as the associated Module. This course is not entirely based on the textbook and the lectures and other materials provided in each module should be accessed. However, the textbook is an important education material, and the purpose of these readings is to

provide supplemental and in-depth information on topics discussed in the module. Topics in the textbook chapters may appear as questions on the exams. The course's textbook is:

Pedigo, L.P.; Rice, M.E. 2009. Entomology and Pest Management, sixth edition, 784 pages. Waveland Press, Inc.

STUDENT PERFORMANCE ASSESSMENT:

Syllabus quiz	40 points	4%
Introductory video	40 points	4%
Discussion (30 points each)	90 points	9%
Six module exams (75 points each)	450 points	45%
Four assignments (70 points each)	280 points	28%
One final exam	<u>100 points</u>	10%
TOTAL	1000 points	100%

COURSE GRADING SCALE:

A = 100-93.50%	B+ = 89.49-85.50%	C+ = 78.49-75.50%	D+ = 68.49-65.50%	
A- = 93.49-89.50%	B = 85.49-82.50%	C = 75.49-71.50%	D = 65.49-61.50%	E = 59.99-0%
	B- = 82.49 -78.50%	C- = 71.49-68.50%	D- = 61.49-60%	

Information on current UF grading policies for assigning grade points is at:
catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

CRITICAL DATES

Deadline	Activity	Points
January 14	Syllabus quiz	40 (4% of total)
January 14	Introductory video	40 (4% of total)
January 20-21	Exam 1 (modules 1 + 2)	75 (7.5% of total)
January 22	Discussion #1	30 (3% of total)
January 28	Assignment #1	70 (7% of total)
February 03-04	Exam 2 (modules 3 + 4)	75 (7.5% of total)
February 11	Assignment #2	70 (7% of total)
February 18	Discussion #2	30 (3% of total)
February 24-25	Exam 3 (modules 5 + 6 + 7)	75 (7.5% of total)
March 24-25	Exam 4 (modules 8 + 9 + 10)	75 (7.5% of total)
March 25	Assignment #3	70 (7% of total)
April 08-09	Exam 5 (modules 11 + 12)	75 (7.5% of total)
April 15	Assignment #4	70 (7% of total)
April 22	Discussion #3	30 (3% of total)
April 22-23	Exam 6 (modules 13 +14)	75 (7.5% of total)
April 29-30	Final exam	100 (10% of total)

COURSE SCHEDULE AND ACTIVITIES CHECKLIST

January 7 - 11:	
	View introductory video of the instructor and the TA
	Obtain textbook

	Read syllabus and take syllabus quiz before 11:59PM January 14
	Post an introductory video: your name, your hometown, previous experience with IPM, career goals, and why are you taking this course - before 11:59PM January 14
	View two PPTs of Module 1: Insect Ecology-Principles Related with Pest Management
	Textbook reading: Chapter 2 pgs. 38-43, Chapter 4 pgs. 163-165, 168-174; Chapter 5 pgs. 177-203, 208-212; Chapter 7 pgs. 266-269
January 14 - 18:	
	View four PPT of Module 2: Introduction to Pest Management: Major Groups of Pests, Historical Events, and Concepts in Integrated Pest Management
	Take syllabus quiz before 11:59PM January 14
	Post an introductory video before 11:59PM January 14
	Textbook reading: Chapter 8 pgs. 287-299 and 304-309
	Exam 1 (Modules 1+2) January 20-21
January 21 - 25:	
	View three PPTs of Module 3: Pests Surveillance and Sampling
	Discussion #1 due before 11:59pm January 22
	Textbook reading: Chapter 6 pgs. 213-215 and 239-240
	Do Assignment #1 before 11:59PM January 28
January 28 – February 1:	
	View two PPTs of Module 4: Making decisions: The Concepts of Economic Injury Levels and Economic Threshold
	Assignment #1 due before 11:59PM January 28
	Textbook reading: Chapter 7 pgs. 255-261, 299-304, 283-284
	Exam 2 (Modules 3 + 4) February 3-4
February 4 - 8:	
	View three PPTs of Module 5: Regulatory Control
	Textbook reading: Chapter 33 optional reading: chapter 23
	Assignment #2 due before 11:59PM February 11
February 11 - 15:	
	Assignment #2 due 11:59PM February 11
	View three PPTs of Module 6: Ecological Management of the Crop Environment and Physical Control
	Textbook reading: Chapter 10 pgs. 338-351, 354-359, 361-366
	Discussion #2 due before 11:59PM February 18
February 18 - 22:	
	View one PPT of Module 7: Plant Resistance
	Discussion #2 due before 11:59PM February 18
	Textbook reading: Chapter 13 pgs. 459-464, 468-471, 488-489
	Exam 3 (Modules 5 + 6 + 7) February 24-25
February 25 -March 1:	
	View the four PPTs of Module 8: Biological Control
	Textbook reading: Chapter 9 pgs. 311-315 and 320-331
March 4 – 8:	
	SPRING BREAK NO CLASS!
March 11 - 15:	
	View PPT of Module 9: Behavior Control
	View the two videos of biological control
	Textbook reading: Chapter 14 pg. 507-520

March 18 -22:	
	View the two PPTs of Module 10: Biopesticides
	Textbook reading: Chapter 12 pgs. 435, 436-443, 444-447
	Exam 4 (Modules 8 + 9 + 10) March 24-25
	Assignment #3 due before 11:59PM March 25
March 25 - 29:	
	View five PPTs of Module 11: Chemical Control with Conventional Insecticides
	Textbook reading: Chapters 11 pgs. 370-421 and 430-431; Chapter 17 pg. 602-605
	Assignment #3 due 11:59PM March 25
April 1 - 5:	
	View two PPTs of Module 12: Genetic Control
	Textbook reading: Chapter 15 pgs. 533-542
	Exam 5 (Modules 11 + 12) April 8-9
April 8 - 12:	
	View two PPTs of Module 13: Insect Resistance, Insect Resistance Management (IRM) in a Context of IPM
	Textbook reading: Chapter 17 pgs. 577-585, 587-595
	Assignment #4 due before 11:59PM April 15
April 15 - 19:	
	View the PPT of Module 14: Area-wide Pest Management
	Exam 6 (Module 13 + 14) April 22-23
	Discussion #3 due before 11:59PM April 22
April 22 - 26:	
	Reading days
April 29 - May 3:	
	Final Exam April 29 – 30

STUDENT PERFORMANCE ASSESSMENTS

SYLLABUS QUIZ

Read the syllabus completely and watch the introductory video of the instructor. Then take a short quiz of 20 multiple choice and/or true/false questions (2 points each) **on or before January 14**. You are allowed three attempts, and only your top score will be recorded.

INTRODUCTORY VIDEO

You will post an introduction of yourself and learn about your classmates. In your self-introduction, you **must** provide the following information:

1. Name
2. Major
3. Hometown
4. Describe any previous experience with pest management
5. Describe why you are in the course
6. Describe your career goals and how pest management might fit in.
7. Your hobby or what you like to do in your free time

The deadline to submission of your introductory video is **January 14, 11:59 PM EST**.

Find in FILES the steps to attach a video to a discussion thread. The **quality of the video** will be graded based on: **answer of the seven items previously listed; sound recording quality; good light (give preference to record outside); and image focus.**

MODULE EXAMS

These exams are taken on-line. Students may use notes, books, and Internet as resources. However, because the exams are **time-limited (50 minutes)**, students should prepare themselves for the exam beforehand rather than depend on finding information during the exam. Each exam could include true/false questions, multiple choice questions, fill-in questions, matching question, and short answer questions. There are six module exams, each worth 75 points (7.5%/exam in the final grade). For each module exam, the student is **allowed two attempts**, and the top score will be recorded. In the same way, for each student, the exam with the lowest score among the six modules exams will be discarded and not included in calculating the final course grade.

Each module exam is accessible from **Sunday 8:00AM EST to Monday 11:59PM EST**.

Module exam schedule:

Exam 1 (Modules 1+2): January 20-21

Exam 2 (Modules 3+4): February 03-04

Exam 3 (Modules 5+6+7): Feb 24-25

Exam 4 (Module 8+9+10): March 24-25

Exam 5 (Module 11 + 12): April 08-09

Exam 6 (Modules 13+ 14): April 22-23

FINAL EXAM

This exam is taken on-line. Students may use notes, books, and Internet as resources. However, because the exam is time-limited (50 minutes), students should prepare themselves for the exam beforehand rather than depend on finding information during the exam. The Final Exam covers all 14 modules and may consists of true/false questions, multiple-choice questions and short answer questions. The student is allowed two attempts, and the top score will be recorded. The Final Exam worth 100 points (10% in the final grade) and is open from **Monday April 29 8:00AM EST to Tuesday 30, 11:59PM EST**.

ASSIGNMENTS

The assignments are to be done individually, not as a group. **Use of information gathered from Wikipedia is not allowed. Citation of Wikipedia will automatically result in a 0 on the assignment.** All assignments must be delivered via UF e-Learning by 11:59PM EST of the due date. An assignment delivered after the due date will be penalized 2 points for each calendar day it is late. **Grammar, neatness, formatting, and spelling will be considered in the evaluation of these assignments.**

ASSIGNMENT #1: Portfolio with plant injury caused by different insect mouthparts.

The learning objectives of this assignment is to be able to identify the three general types of insect mouthparts and recognize the six injuries on plant tissues caused by different insect mouthparts.

For this assignment, you will prepare a photo-based portfolio with 12 photos of plant tissue injuries caused by insects. The photos should display an identifying characteristic of the plant injury representing the following categories (according to Chapter 7 of the textbook): 1) stand reduction; 2) defoliation; 3) sapper assimilation; 4) turgor reduction; 5) fruit feeding; and 6) plant architecture modification. At least one photo in the portfolio should portray each one of these plant injuries.

For each photo, you will provide the following information in the caption:

- Name of the plant injury category
- Common name of the host plant portrayed in the photo
- Name of the insect order that cause the plant injury portrayed in the photo.
- Type of the insect mouthpart that causes the plant injury portrayed in the photo
- Insect life cycle stage that causes the plant injury portrayed in the photo
- List the common and scientific name of at least one insect pest that can cause the plant injury portrayed in the photo.

Important rules: 1) it is recommended that you take your own photos as a good exercise to recognize different plant injuries and different mouthparts of insect pests in different systems. In case you are not able to do that, and you need to use photo taken by others from the internet, you should observe copyrights when using them (always cite the source of the picture); 2) photos with bad composition or bad focus receive not credit. I need to be able to

tell what it is, otherwise it isn't a good enough photo; 3) you can use photos of plant injury caused by immature insect pests; 4) illustrate the portfolio with appropriate sized images, figure number, and caption including the information previously indicated; 5) use Arial or Tahoma, font size 14 for title, font size 12 for your name, font size 12, uniform, pale background; 6) when completed, convert the PowerPoint/Illustrator slide to a one-page PDF. Name with your **last name_ assig1** and submit the PDF via Canvas.

ASSIGNMENT #1 IS DUE January 28, 2019

ASSIGNMENT #2:

The learning objectives of this assignment is to appraise importance of a correct pest identification, selection of different pest sampling techniques for pest population monitoring and be familiar with economic damage thresholds established for pests.

Extension poster for identifying and monitoring a pest

Research **one of the** plant pest species **listed** below and develop an extension poster using PowerPoint or Illustrator. A sample poster is on the course's Canvas site. Address the following topics in the poster:

- Identification, brief biology, host plants, injury, and economic impact caused by the pest.
- Detailed sampling method(s) to monitor the pest and whether the sampling method(s) measures absolute density or relative abundance.
- Other information besides pest numbers that should be monitored (*e.g.*, rainfall, plant stage, beneficial organisms) and how these factors are monitored. **DO NOT** mention control methods.
- References cited.

Use the poster template available on the UF e-Learning site (see Assignment #2 instructions). Illustrate the poster with appropriately sized images, graphs, and/or tables. When completed, convert the PowerPoint/Illustrator slide to a one-page PDF. EVERYTHING (including references) should fit comfortably on the one page.

Important rules: 1) use font Arial or Tahoma, font size 72 for title, font size 40 for your name, font size 32 or 36 for text; 2) use a uniform, pale background with dark letters in bold (no shadowing); 3) give each figure (image, graph, or table) a number (*e.g.*, Fig. 1, Table 2) and a brief caption, and cite each figure (as Fig. 1 or Table 2) in the text; 3) Cite the sources of all pictures; and 4) Since it is an extension poster, make it attractive yet concisely informative to the extension client; 5) when completed, convert the PowerPoint/Illustrator slide to a one-page PDF, name with your **last name_ assig2**, and submit the PDF via Canvas.

Pest species

Silverleaf whitefly - *Bemisia argentifolii*
 Diamondback moth – *Trichoplusia ni*
 Southern green stink bug – *Nezara viridula*
 Western Flower Thrips - *Frankliniella occidentalis*
 Spotted wing drosophila - *Drosophila suzukii*
 Melon Aphid – *Aphis gossypii*
 Colorado Potato Beetle - *Leptinotarsa decemlineata*
 Tomato fruitworm – *Helicoverpa zea*
 Fall armyworm – *Spodoptera frugiperda*
 Asian citrus psyllid - *Diaphorina citri*

ASSIGNMENT #2 IS DUE February 11, 2019

ASSIGNMENT #3: Commercial natural enemies and formulations available to pest biological control - comparative analysis of six commercially available natural enemies/pesticides.

Prepare a chart for each of the six agents of biological control listed below with the name of three companies on-line (including their website address) that sell commercial formulation of them. **The three companies do not need to be the same for all six agents of biological control.**

For each commercial biological control agent, list the products among the three companies (see example below), including information about: 1) pricing; 2) target pests; 3) quantities available; 4) packaging (*e.g.*, stage shipped); 5) availability of supporting information (*e.g.*, release/application recommendation, target pests, biology, anything else); and 6) which company you would purchase the natural enemy and briefly explain your choice. The charts should be converted to PDF. Name with your last **name_assig3** and submit the PDF via Canvas.

The six agents of biological control are:

- *Trichogramma* sp.: There are several species but all attack insect eggs; select ONE species and compare it across the three companies. Be sure to provide the name of the species.
- *Chrysopa/Chrysoperla* (predators commonly called aphid lions and green lacewings): There are several species; select ONE species and compare it across the three companies. Be sure to provide the name of the species.
- Any species of lady beetle (Coccinellidae): There are several species; select ONE species and compare it across the three companies. Be sure to provide the name of the species.
- Any species of predatory mite: There are several species but all attack insect eggs; select ONE species and compare it across the three companies. Be sure to provide the name of the species.
- Bacteria-based biopesticide: There are several bacteria species sold for pest management; select and compare three products that contain the same bacteria species.
- Fungus-based biopesticide: There are several fungus species sold for pest management; select and compare three products that contain the same fungus species.

Example of chart:

Agent of biological control	Company name	Commercial name	Price \$US	Target pests	Quantity/formulation available	Stage shipped	Release /application recommendation	Company choice and explanation
<i>Chrysoperla carnea</i>	1							
	2							
	3							

ASSIGNMENT #3 IS DUE March 25, 2019

ASSIGNMENT #4: Understanding the pesticide label

The learning objective of this assignment is to understand the major components of a pesticide label and the aspects to be considered when choosing an insecticide for chemical control of pests.

Download the labels of insecticides provided in assignment #4 in canvas and answer the following questions for each insecticide:

1. What is the brand name of the insecticide?
2. Who is the manufacturer of the insecticide?
3. What is the common name of the active ingredient of the insecticide?
4. What is the chemical class of the insecticide?

5. What is the mode of action of the insecticide?
6. What is the signal word listed on the insecticide?
7. What is the formulation of the insecticide?
8. What is the re-entry period of the insecticide?
9. What is the PPE required when applying the insecticide?

ASSIGNMENT #4 IS DUE April 15, 2019

DISCUSSION BOARD

The Discussions are your opportunities to interact, share thoughts and ideas, agree and disagree, and learn from each other. The discussion periods will be open for two weeks for you to take time for a thoughtful, researched, yet personal response. After you provide your response, you should read the postings from others in your group and reply with your thoughts and opinion in an academic manner. "I agree" type of reply is not enough to receive a grade.

Discussion #1 is open **January 14** and the deadline is **January 22**

Discussion #2 is open **February 4** and the deadline is **February 18**

Discussion #3 is open **April 8** and the deadline is **April 22**

UNIVERSITY OF FLORIDA POLICIES AND ASSISTANCE

Absences and Make-Up Work

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx."

Online Course Evaluation Process

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at evaluations.ufl.edu/results/.

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*" You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment.*"

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g., assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: www.dso.ufl.edu/SCCR/honorcodes/honorcode.php.

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/*
- | | |
|---------------------------|-----------------------------|
| Counseling Services | Self-Help Library |
| Groups and Workshops | Training Programs |
| Outreach and Consultation | Community Provider Database |

- *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Distance Courses

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See www.distance.ufl.edu/student-complaint-process.