

# FUNDAMENTALS OF PLANT-PEST MANAGEMENT

## IPM 3022

### SPRING 2018

Credits: 3

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**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. Specific cases of pest management in plant production systems will be studied. 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. Project papers on pest management for a selected crop will be prepared by teams of students. Discussion sessions will allow students to share opinions, perspectives, and experiences about specific topics.

In this course, the student will learn:

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

The course is comprised of 14 modules. Each module has 1-5 narrated PowerPoint presentations (**PPTs**) that are 8-28-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 should be viewed weekly in order to complete all exams and assignments in a timely fashion and participate in the discussions.

**TEXTBOOK READING** should be read during the same week as the associated PPT. The purpose of these readings is to provide supplemental information on topics discussed in the PPTs. Major topics (not minor details) in the textbook chapters may appear as questions on the exams. The course's textbook is:

**Radcliffe, E.B., Hutchison, W.D., Cancelado, R.E. 2009.** Integrated Pest Management: concepts, tactics, strategies and case studies. Cambridge University Press. ISBN 978-0-521-69931-0 or 978-0-521-87595-0.

**STUDENT PERFORMANCE ASSESSMENT:**

Syllabus quiz	20 points
Introductory video	50 points
Seven module exams (50 points each)	350 points
Three assignments (50 points each)	150 points
Group project paper	210 points
Three discussions	
(50 points each = 1 point for the first post and 49 points for the second post)	150 points
<u>One final exam</u>	<u>70 points</u>
<b>TOTAL</b>	<b>1,000 points</b>

**COURSE GRADING SCALE:**

A = 100-93%	B+ = 89-87%	C+ = 79-77%	D+ = 69-67%	
A- = 92-90%	B = 86-83%	C = 76-73%	D = 66-63%	E = 59-0%
	B- = 82-80%	C- = 72-70%	D- = 62-60%	

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

**CRITICAL DATES**

Deadline	Activity	Points
January 16	Introductory video	50
January 16	Syllabus quiz	20
January 22	Project Paper - team formation and topic selection deadline without penalty	20
January 28-29	Exam 1 (modules 1 + 2)	50
February 5	Discussion #1 Part 1	1
February 12	Discussion #1 Part 2	49
February 19	Assignment #1	50
February 11 to 12	Exam 2 (modules 3 + 4)	50
February 25-26	Exam 3 (modules 5 + 6)	50
March 12	Project paper draft submission	80
March 18-19	Exam 4 (modules 7 + 8)	50
March 19	Discussion #2 Part 1	1
March 26	Discussion #2 Part 2	49
March 26	Assignment #2	50
April 1-2	Exam 5 (modules 9 + 10)	50
April 9	Assignment #3	50
April 15-16	Exam 6 (modules 11 + 12)	50
April 16	Discussion #3 Part 1	1
April 23	Discussion #3 Part 2	49
April 22-23	Exam 7 (modules 13)	50
April 23	Final version of project paper	
April 30 to May 1	Final exam	70

## COURSE SCHEDULE AND ACTIVITIES CHECKLIST

<b>January 8-15:</b>	
	View introductory video of the instructor and the TA
	Obtain textbook
	Read syllabus and take syllabus quiz before 11:59PM January 16
	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 16
	View four PPTs of Module 1: Introduction to Pest Management: Major groups of pests, historical events and concepts in Integrated Pest Management.
	Read chapters 1 and 37, the paper Stern et al., 1959 and post comment in the discussion #1
<b>January 16-22:</b>	
	View three PPT of Module 2: Insect ecology - principles related with pest management
	Take syllabus quiz before 11:59PM January 16
	Textbook reading: Chapter 5
	Take syllabus quiz before 11:59PM January 16
	Project Paper team formation and submission to instructor before 11:59PM January 22
<b>January 23-29:</b>	
	View three PPTs of Module 3: Pest Sampling
	Textbook reading: Chapter 7 and complementary material: chapter 6 Pedigo and Rice
	Exam 1 (Modules 1+2) January 28-29
<b>January 30 – February 5:</b>	
	View two PPTs of Module 4: Making decisions: The concepts of Economic Injury Levels and Economic threshold
	View video on IPM for blueberries
	Textbook reading: Chapter 3 and complementary material: chapter
	Discussion #1 – first post before 11:59PM February 5
<b>February 6 - 12:</b>	
	View three PPTs of Module 5: Regulatory control
	Textbook reading: Chapter 33 optional reading: chapter 23
	Exam 2 (Modules 3+4) February 11-12
	Discussion #1 – at least one response to posts before 11:59PM February 12
<b>February 13 - 19:</b>	
	View five PPTs of Module 6: Cultural and physical control
	Textbook reading: Chapters 10 and 24
	Do assignment #1 – February 19
<b>February 20 - 26:</b>	
	View one PPT of Module 7: Behavior control
	View the three videos on IPM for tomatoes and mating disruption
	Textbook reading: Chapter 21 and 32
	Exam 3 (Modules 5+6) February 25-26
<b>February 27-March 2:</b>	
	View first six PPTs of Module 8: Chemical control
	Textbook reading: Chapter 13 and complementary material: chapter 11, Pedigo and Rice
	Optional reading: Textbook: Chapters 16 and 17
<b>March 12-19:</b>	

	View last two PPTs of Module 9: Biological Control
	View the three videos of biological control
	Reading textbook: Chapters chapters 6, 9, 12, and 14
	Project Paper draft submission by March 12
	Discussion #2 – first post before 11:59PM March 19
	Exam 4 (Module 7 + 8) March 18-19
<b>March 20-26:</b>	
	View the PPT of Module 10: Plant Resistance
	Optional textbook reading: Chapter 18
	Do assignment #2 – March 26
	Discussion #2 – at least one response to posts before 11:59PM March 26
<b>March 27-April 2:</b>	
	View two PPTs of Module 11: Genetic Control
	Textbook reading: Chapters 11
	Exam 5 (Module 9 +10) April 1-2
<b>April 3-9:</b>	
	View one PPTs of Module 12: Insecticide Resistance Management (IRM)
	Textbook reading: Chapter 19
	Do assignment #3 – April 9
<b>April 10-16:</b>	
	View two PPTs of Module 13: Area-wide Pest Management
	Textbook reading: Chapters 25 and 26
	Discussion #3 – first post before 11:59PM April 16
	Exam 6 (Module 11 + 12) April 15-16
<b>April 17-23:</b>	
	View two PPTs of Module 14: IPM – lesson learned
	Exam 7 (Module 13) April 22-23
	Final Project Paper due April 23
	Discussion #3 – at least one response to posts before 11:59PM April 23
<b>April 24-27:</b>	
	Reading days
<b>April 30- May 1:</b>	
	Final Exam April 30 – May 1

## STUDENT PERFORMANCE ASSESSMENTS

### SYLLABUS QUIZ

Read the syllabus completely. Then take a short quiz of 10 multiple choice and/or true/false questions (2 points each) on or before January 15. You are allowed three attempts, and only your top score will be recorded.

### MODULE EXAMS

These short exams are taken on-line. Students may use notes, books, and Internet as resources. However, because the exams are time-limited (70 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. For short answer questions, all responses must be in your own words. There are seven module exams, each worth 50 points. For each student, the exam with the lowest score is 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. Exam schedule:  
Exam 1 (Modules 1+2): January 28-29      Exam 2 (Modules 3+4): February 11-12

Exam 3 (Modules 5+6): Feb 25-26  
 Exam 5 (Module 9 + 10): April 1-2  
 Exam 7 (Modules 13): April 22-23

Exam 4 (Module 7 + 8): March 18-19  
 Exam 6 (Modules 11+ 12): April 15-16  
 Final exam: April 30-May1

## 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 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: Extension poster for identifying and monitoring a pest

Research one plant pest species 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, and injury caused by the plant 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 #1 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. Submit the PDF via Canvas.

#### TIPS:

- Use font Arial or Tahoma
- Use font size 72 for title, font size 40 for your name, font size 32 or 36 for text.
- Use a uniform, pale background with dark letters in bold (no shadowing)
- 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.
- Remember: It is an extension poster, so make it attractive yet concisely informative to the extension client.

### ASSIGNMENT #1 IS DUE February 19, 2018

### ASSIGNMENT #2: Comparative analysis of four commercially available natural enemies

For each of the four natural enemies listed below, locate three companies on-line that sell them (the three companies need not be the same for all four natural enemies). For each natural enemy, compare the products among the three companies. Compare pricing, quantities available, packaging (*e.g.*, stage shipped), and availability of supporting information (*e.g.*, release recommendation, target pests, biology, anything else). Also, mention from which company you would purchase the natural enemy and briefly explain your choice. The four natural enemies 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.

Provide the name of each company mentioned and its website address. The information provided may be

presented in chart form.

**ASSIGNMENT #2 IS DUE March 26, 2018**

### **ASSIGNMENT #3: Comparative analysis of four commercially available biopesticides**

For each of the four types of biopesticides listed below, locate three companies on-line that sell them (the three companies need not be the same for all four biopesticides). For each biopesticide, compare the products among the three companies. Provide the name of the product sold by each company and the organism species on which the product is based. Compare pricing, quantities available, and availability of supporting information (*e.g.*, application recommendation, target pests, website quality, anything else). Also, mention which biopesticide product from which company you would purchase to control a specific pest and briefly explain your choice. The four biopesticide groups are:

- \* Fungus-based biopesticide: There are several fungus species sold for pest management; select and compare three products that contain the same fungus species.
- \* Bacteria-based biopesticide: There are several bacteria species sold for pest management; select and compare three products that contain the same bacteria species.
- \* Nematode-based biopesticide: There are several nematode species sold for pest management; select and compare three products that contain the same nematode species.
- \* Any biopesticide not based on a fungus, bacterium, or nematode (*e.g.*, virus, protozoan, plant): The four products compared should all be based on the same species of organism.

Provide the name of each company mentioned and its website address. The information provided may be presented in chart form.

**ASSIGNMENT #3 IS DUE April 9, 2018**

### **GROUP PROJECT PAPER**

The project paper is a synthesis of information from literature and/or experience on pest management in a cropping system. Students will form teams of four individuals to collectively research, prepare, and present a project paper on pest management in a cropping system they have selected from a list provided here. No two project papers on the same crop may be done, so decide on a crop, form the team membership, and have these approved by the instructor and on or before **11:59PM January 22, 2018**. Students should form their teams in the course's Canvas site. Team membership and crop selection approval after the due date will be penalized 1 point for each calendar day it is late.

The four members of the team shall decide how to apportion among themselves the four principal parts of the project paper: 1) Introduction, conclusions, and references cited (compilation and formatting); 2) Key pests; 3) Monitoring key pests; 4) Management tactics targeting the key pests.

The project paper should include a title, author names and location (city, state), and the following six sections with the headers given here:

#### **TITLE IN BOLD, SMALL CAPS, AND FONT SIZE 14**

Authors by order of principal parts (indicate clearly the author of Introduction/Conclusion, author of Key Pests, author of Monitoring Key Pests, and author of Management Tactics)

#### **Introduction**

This section should describe the crop, its economic importance, and general aspects of its production. The geographic scope of the pest management addressed in the paper should be clearly stated. For example, cotton is grown worldwide, but it is far too much to discuss in the project paper cotton pest management for all regions of the world. If the paper focuses on cotton production in the southeastern USA, state that. Limit this section to no more than 300 words.

#### **Key Pests**

See Module 1 for the concept of a key pest. Subheadings followed by a period (*e.g.*, **Insects.**) at the

beginning of a paragraph can be used to distinguish text concerning each pest group. Not all pests associated with the crop need be addressed in this section, only the important ones in the relevant geographic area. Provide scientific and common (if any) names of the pests. Describe the injury they cause, why they must be managed, whether they are native or invasive, and any important and relevant aspects of their biology that are critical to their management. Images of the pests (not necessarily all) and the damage they cause will add to the quality of the project paper.

### Monitoring Key Pests

In this section, you should describe in detail yet concisely and clearly how to monitor the key pests of the crop. Do not describe the monitoring of a pest that is not mentioned in the previous section. Explain how, when, and where the pest monitoring (sampling) is performed. If economic thresholds exist, explain them. Details are good.

### Management Tactics

All tactics used for pest management of the key pests in the cropping system should be thoroughly described in this section. You may use subheadings (*e.g.*, **Cultural Control**, **Biological Control**, **Chemical Control**, **Physical Control**, **Host Plant Resistance**.) at the beginning of a subsection to distinguish text concerning each control type. A discussion of the costs of the various tactics will enhance the paper significantly. Mention any risks associated with the tactics. Again, details (*e.g.*, rates of pesticide applications, species of natural enemies released, species or common name of companion crops) are good.

### Conclusion

Write a summary conclusion here. If there are any data on grower adoption of IPM methods, summarize them here. Mention ideas for future research or what is needed to improve pest management in the crop. Limit this section to no more than 400 words.

### References Cited

At least three journal articles and/or books must be cited and their references listed. Google Scholar is a good starting point. Use of information gathered from Wikipedia is not allowed. Citation of Wikipedia will automatically result in a 0 on the project paper. Cite in the text all references listed; list in the References Cited all literature and website sources cited in the text. Use this format for in-text citations:

Spangler (1991) or (Spangler 1991) for one author; Wood and Bright (1987) or (Wood and Bright 1987) for two authors; Orbach *et al.* (1995) or (Orbach *et al.* 1995) for three or more authors.

Include all the authors' names under References Cited. Names of persons who provide unpublished information should include initials in the text, *e.g.*, N. E. Woodley, personal communication (for information obtained orally) or N. E. Woodley, *in litt.* (for personal communication obtained in writing).

List references alphabetically by author surname under References Cited. Do not list references that are not cited in the text, tables, or figure legends. Format the references in a manner of your choice (*e.g.*, APA, MLA, Chicago, Turabian, IEEE, or that which any refereed journal uses), but use the same format consistently for all references.

The collective project paper must **not exceed 10 pages** in length. The text must be single-spaced with font Times New Roman size 12. Use 1" margins on all sides and no space between paragraphs. Do not use contractions (*e.g.*, aren't, it's, wasn't). Figures (images and graphs) and tables are encouraged, but each figure and each table must be assigned a unique number (*e.g.*, Fig. 1, Table 2), and all figures and tables must be cited in the text.

Each team member should submit the complete (*i.e.*, all parts included), well-written project paper draft through Canvas on or before **March 12, 2018**. It is highly advisable that each member read and edit the contributions from the other three team members before submission of the draft. Drafts received after the due date will lose 5 points per day during a 5-day grace period. Any team member who does not deliver the complete project paper draft before the end of the grace period will receive a maximum of 10 points for the entire group project.

The instructor and TA will review the paper, make comments and suggestions, and return the draft to the teams no later than April 8. Each part will be scored separately, based on completeness of content, correlation with other parts, grammar, and correct and consistent formatting. See the scoring rubric for Group Project Paper on the course’s Canvas site.

The team will revise the project paper according to the review comments and suggestions. Each team member will deliver the final project paper through Canvas **no later than April 9, 2018**. A late final version of the paper will be penalized 5 points for each calendar day it is late. The paper will be scored as a whole, based on completeness of content, correlation with other parts, grammar, and correct and consistent formatting.

**Project paper task:**

**Maximum points:**

Team formation and crop selection approved by January 22	20 points
Quality of contribution to draft delivered on or before March 12	80 points
Quality of complete final paper delivered on or before April 23	110 points

**Cropping systems:**

Each team should collectively select one crop from this list. No two teams may select the same cropping system.

almon	apple	banana	cabbage/broccoli
Citrus	coffee	corn	cotton
Canola	Pines	grape	greenhouse-grown
peach	peanut	bell pepper	rice
soybean	strawberry	pineapple	turf
melon	avocado	tomato	carrot
		wheat	



## DISCUSSIONS

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. **Your initial postings must be placed during the first week. No posting during this period will result in a 0 score for that Discussion.** 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 sufficient to receive a grade.

### SCORING:

One response per discussion = 1 points each discussion  
 More than one or more replies per discussion = 49 extra points each discussion

Discussion #1 is open January 30 (initial post during January 30-February 5, second post during February 6-12)

Discussion #2 is open April 13 (initial post during March 13-19, second post during March 20-26)

Discussion #3 is open April 10 (initial post during April 10 -16, second post during April 17-23)

## INTRODUCTORY VIDEO

You will post an introduction of yourself and learning about your classmates. In your self-introduction, give your name, major, and hometown. State why you are in the course (for example, required course, want to control pests in your organic garden). Describe any previous experience with pest management. Describe your career goals and how pest management might fit in. The deadline to submission of your introductory video is **January 16, 11:59 PM EST.**

**Find in FILES the steps to attach a video to a discussion thread.**

## FINAL EXAM

This exam is taken on-line. Students may use notes, books, and Internet as resources. However, because the exam is time-limited (70 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 consists of multiple choice questions and short answer questions. For short answer questions, all responses must be in your own words. The Final Exam is open from Sunday **April 30 8:00AM EST to Monday 1, 11:59PM EST.**

## 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](http://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](http://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/](http://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](http://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/](http://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/](http://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/](http://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](http://www.distance.ufl.edu/student-complaint-process).