



Agricultural "IPM Year" graphic and text courtesy of Cornell University

INTEGRATED PEST MANAGEMENT

ENTM 609 (4 credits)

Spring 2022

(Last Modified: June 2, 2021)

Instructor: Dr. Kelly A. Hamby
 Department of Entomology
 3124 Plant Sciences Bldg.
 University of Maryland, College Park
 301-314-1068
kahamby@umd.edu
hambylab.weebly.com

Office hours: By appointment.

Course communication: All course information will be sent via ELMS e-mail. You may contact me via ELMS or e-mail. UMD Department of Psychology's [e-mail etiquette for everyone](#) provides a useful brief overview on professional correspondence.

Course sessions:

Tuesday/Thursday 8:00AM-10:45AM Plant Sciences Bldg., Room 1161

Course sessions include field trips, laboratories, active learning activities, discussions and lectures. The course will meet early on field trip days at 7:00AM at the loading dock behind the Plant Sciences Building. Please make arrangements with me at the beginning of the semester if you are not able to come early as any students who are not present at 7:00AM will miss the field trip.

OVERVIEW

Long-term global food security requires a sustainable increase in agricultural productivity to ensure the availability and accessibility of safe and nutritious food. Agricultural pests reduce global food production and threaten its sustainability. This course explores sustainable pest management in agroecosystems using the integrated pest management (IPM) paradigm. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a

combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. While this course focuses on pests of agroecosystems, we will also cover pests of structures, ornamentals, nurseries, greenhouses, and forestry to highlight the diverse applications of the IPM paradigm.

Learning Outcomes:

After successfully completing this course you will be able to:

- Demonstrate an understanding of the terms, concepts, and approaches used by IPM practitioners.
- Critically think about political, social, economic, and environmental dimensions involved in IPM adoption and pest management decision making.
- Effectively communicate pest management information to stakeholders in writing and via oral presentations.
- Synthesize research-based pest management information, critically evaluate the limits of this information, and provide well-reasoned pest management solutions to stakeholders.

RESOURCES

Required Resources:

Course website: elms.umd.edu

Optional Textbooks:

No specific text is required for this course. Useful resources include:

- Pedigo LP, Rice ME (2009) Entomology and Pest Management, 6th ed. Pearson Education, Inc. ISBN-13: 978-0-13-513295-1
- Radcliffe EB, Hutchison WD, Cancelado RE (eds) (2015) Radcliffe's IPM World Textbook, URL: <http://ipmworld.umn.edu>, University of Minnesota, St. Paul, MN.
- National Research Council (1996) Ecologically Based Pest Management: New Solutions for a New Century. National Academies Press. ISBN-13: 978-0-309-05330-3
- Vreysen MJB, Robinson AS, Hendrichs J (eds) (2007) Area-Wide Control of Insect Pests: From Research to Field Implementation. Springer. ISBN -12: 978-1-4020-6059-5
- Yu SJ (2008) The Toxicology and Biochemistry of Insecticides. Taylor and Francis Group, LLC. ISBN-13: 978-1-4200-5975-5

POLICIES

Campus Policies:

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct

- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please review the Graduate School's [campus-wide policies](#) as well as the [course related policies](#) of The Office of Undergraduate Studies. Follow up with me if you have questions.

Course-Specific Policies:

No computers, phones or tablet devices are permitted during our class meetings. I understand and have considered arguments for permitting laptop and tablet computers in the classroom. However, in my experience (and based on the research evidence) they present an irresistible distraction and detract from the cooperative learning environment. Research has found that these distractions do in fact interfere with learning and active participation. For that reason, the use of computers and phones will not be permitted during class meetings (except when required for ADS accommodations). If a computer is needed to accomplish a class objective for the day I will provide it or give you advanced notice to bring one with you.

I expect you to make the responsible and respectful decision to refrain from using your cellphone in class. If you have critical communication to attend to, please excuse yourself and return when you are ready. For more information about the science behind the policy watch: youtu.be/WwPaw3Fx5Hk

Absences. Scheduled excused absences must be discussed with me by the end of the first week of class to develop and schedule makeups. Unplanned excused absences will be handled on a case-by-case basis and should be discussed as soon as possible after the absence has occurred.

Names/Pronouns and Self Identifications:

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, it is your choice whether to disclose all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) including how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability and this information should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

ASSIGNMENTS

IPM reflection (30 pts): Attend or participate in an outside of class learning activity that relates to Integrated Pest Management. This could be reading or watching a news release, extension, or journal article; attending a seminar, webinar, or conference presentation(s); or any other informative activity that provides approximately 30 minutes of content. If you need help finding something appropriate please contact me. The IPM reflection is due by 10PM 3/8.

Extension presentation (70 pts): Provide a 15-minute presentation targeted at a stakeholder audience providing IPM information for a pest (insect, weed, pathogen) of your choice. Pest

cannot be one that you have performed research on. Your pest choice is due by 10 PM on 2/15. Presentations will be held in class on 3/15 and 3/17. A rubric is posted on ELMS to help you understand what I am looking for.

Extension fact sheet (100 pts): Provide a 1-2 page fact sheet on IPM of your pest of choice (same pest as above) that includes text, figures, and references and is targeted at a stakeholder audience. Your fact sheet is due by 10 PM on 4/12. A rubric and a couple of examples are posted on ELMS to help you understand what I am looking for.

Interactive learning activity (100 pts): Design an approximately 30-minute interactive learning activity for a specific target audience (e.g., 7-12 year olds, high school, undergraduate, graduate, stakeholder). The activity may be designed according to any interactive learning structure (e.g., a lab, POGIL, etc.) and should teach an IPM concept. Please provide or describe all materials necessary for the activity (handouts, instructions, answer key). There is no better way to get a grasp on material than to teach it to someone else, so consider selecting a topic that you found challenging. The topic of your project is due by 10 PM on 4/5. The project is due by 10 PM on 5/3. A rubric and a couple of examples are posted on ELMS to help you understand what I am looking for.

PARTICIPATION

Course content has been designed to provide opportunities for skill building and active learning. The effectiveness of this approach depends on students being present and actively engaged as well as respectful and supportive of each other. Please see [Petress, K. 2006. An operational definition of class participation. College Student Journal 40:821-823](#) (also posted as a PDF on ELMS), for course participation expectations. Because participation is such an important part of your learning and I have tried to minimize outside of class work, participation makes up 50% of your grade in this class and will be evaluated using the following approaches:

End of class exit tickets (10 pts each): Index cards will be available during every course meeting. In any 10 course sessions of your choice, use these to write down and submit at the end of class one of the following: 1) a question about something you did not understand during the class session, 2) a description of how the material covered in that class is important to your career goals and/or daily life, or 3) a summary of one interesting thing you learned during class.

Field trip discussion questions (20 pts each): Turn in 2-3 questions you would like to ask our field trip host at the beginning of every field trip.

Reporting group discussions out to class (10 pts each): We will break into groups to discuss course material often, and one member of each group will report their group's thoughts out to the whole class. You should take this reporting role at least 10 times during the semester.

Presentation peer-reviews (100 pts total): Use printed rubrics to provide constructive feedback to your peers during each of their extension presentations.

READINGS

Before
Class

Reading

Thurs 1/27	Farrer, J.J., Baur, M.E., and S.F. Elliott. 2016. Adoption of IPM practices in grape, tree fruit, and nut production in the Western United States. <i>Journal of Integrated Pest Management</i> 7(1): 8
Thurs 3/29	Bug eat bug- controlling pests with other insects (and video) https://www.bbc.com/news/business-42096405
Tues 4/26	Peterson, R.K.D., Higley, L.G., and L.P. Pedigo. 2018. Whatever happened to IPM?

GRADING

All assessment scores will be posted on the course ELMS page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet in my office.

Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Learning Assessments	#	Points Each	Category Total	Category Weight
Assignments	3	Varies	200	20%
In-class assessments	5	40	200	20%
End of class exit tickets	10	10	100	10%
Field trip discussion questions	5	20	100	10%
Reporting group discussions out to class	10	10	100	10%
Presentation peer-reviews	Varies	Varies	100	10%
Interactive learning activity	1	100	100	10%
Final Exam	1	100	100	10%
Total Points:			1000	

Final letter grades are assigned based on the percentage of total assessment points earned, rounded to the nearest whole number. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same this as making the cut (89.4 \neq 90.0). It would be unethical to make exceptions for some and not others.

Course Grading Scale. A+ (100-97%), A (96-94%), A- (93-90%), B+ (89-87%), B (86-84%), B- (83-80%), C+ (79-77%), C (76-74%), C- (73-70%), D+ (69-67%), D (66-64%), D- (63-60%), F (<60%)

CLASS SCHEDULE

Note: This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made.

Date	Class Meeting	Laptop	Assignment Due
Tues 1/25	Course overview and introduction to Extension and IPM	N	
Thurs 1/27	IPM concept and “steps” of IPM Farrar et al. 2016 discussion	N	Read Farrar et al. 2016 by 8 AM
Tues 2/1	Insect damage and identification Insect pest identification	Y	
Thurs 2/3	Diagnostics (Guest Lead by Dr. Karen Rane) Diagnostics activity	N	
Tues 2/8	Monitoring and sampling Trap design activity, in class assessment	Y	
Thurs 2/10	Damage thresholds (POGIL)	N	
Tues 2/15	Phenology Models (POGIL)	N	Pest topic due by 10 PM
Thurs 2/17	Insecticides: formulations and modes of action Pesticide labels part 1	N	
Tues 2/22	Pesticide safety, regulations, and MRLs Pesticide labels part 2	N	
Thurs 2/24	Bioassay Lab	N	
Tues 3/1	Insecticide resistance and lab wrap up In class assessment	Y	
Thurs 3/3	7AM Field Trip CMREC Beltsville Pesticide Sprayers and Sprayer Calibration	N	Participation questions due at 7AM
Tues 3/8	Behavioral control and pheromones Behavioral control case studies In class assessment	Y	Reflection assignment due by 10 PM
Thurs 3/10	7AM Field Trip Larriland Farms IPM on a diversified farm	N	Participation questions due at 7AM
Tues 3/15	Extension presentations	N	Extension presentations due by 8 AM Presentation peer reviews due at end of class
Thurs 3/17	Extension presentations	N	Presentation peer reviews due at end of class
Spring Break			

Tues 3/29	Biological control Biological control case studies Discussion of “Bug eat bug” article, Koppert biological systems	Y	Bug eat bug reading due by 9 AM
Thurs 3/31	Biological control and entomopathogens Entomopathogen demonstration lab	N	
Tues 4/5	Cultural controls In class assessment	Y	Project topic due by 10 PM
Thurs 4/7	Cultural controls Cultural control case study	N	
Tues 4/12	Host plant resistance and GMOs Handy Bt trait table activity	N	Fact sheet due by 10 PM
Thurs 4/14	7AM Field Trip to Raemelton Farm IPM at a nursery (Guest lead Dr. Paula Shrewsbury)	N	Participation questions due at 7AM
Tues 4/19	RNAi and gene drive Guest gene drive discussion with Brian Lovett	N	
Thurs 4/21	Field Trip CMREC Beltsville Sampling and monitoring	N	Participation questions due at 7AM
Tues 4/26	Insect vectored plant diseases In class assessment Discussion of “Whatever happened to IPM?”	Y	Whatever happened to IPM? Reading due by 9 AM
Thurs 4/28	Field Trip USDA Beltsville Guest Lead Dr. Kim Lewers Plant Breeding and Host Plant Resistance TBD	N	Participation questions due at 7AM
Tues 5/3	Areawide pest management Areawide pest management case studies	N	Project due by 10 PM
Thurs 5/5	Review, careers in IPM, alternate date for field trip or snow day	N	
Tues 5/10	FINAL ASSESSMENT	Y	