ENY 6575
Apiculture II
Spring 2023
3 credits

ENY 6572 Apiculture I is a prerequisite for this course.
***This course is co-taught with ENY 4574 Beekeeping II.**

Instructor: Cameron Jack, PhD
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Special Note on Contact via Email: Due to UF privacy laws, you must use your GatorLink account or the Canvas mail system when emailing the Instructor or TA. Emails sent from other accounts (gmail, hotmail, etc.) will not be answered by the Instructor or TA.

Office Hours: By appointment.

Course Description: This course will provide more depth on topics introduced in Apiculture I including beekeeping styles, colony stressors and yearly management. This course will also explore issues affecting the beekeeping industry including integrated pest management, pests/diseases, African bees, commercial pollination, queen production, bee removals and pesticides will be discussed.

Course Learning Objectives:
1. Compare abiotic and biotic stressors of honey bee colonies and describe how to mitigate these issues.
2. Create a management plan applying the principles of integrated pest management to control honey bee pests and diseases.
3. Recognize the nest conditions that promote the establishment of pests and diseases and their associated symptoms.
4. Identify the many ways in which commercial beekeepers can make a profit and what is required to be successful for each commodity.
5. Interpret the findings from various pesticide research publications and discuss the implications they may have on honey bee colonies.
6. Produce a video that will teach correct beekeeping best management practices to non-technical audiences.

Required Readings:

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1. Moritz, R. and Erler, S. 2016. Lost colonies found in a data mine: Global honey trade but not pests or pesticides as a major cause of regional honeybee colony declines. Agriculture, Ecosystems & Environment, 216: 44-50.
2. Steinhauer, N. et al. 2018. Drivers of Colony Loss. Current Opinion in Insect Science 26: 142-148.
3. Jack, C. and J. Ellis. 2021. Integrated Pest Management Control of *Varroa destructor* (Acari: Varroidae), the Most Damaging Pest of *Apis mellifera* L. (Hymenoptera: Apidae) Colonies. Journal of Insect Science 21(5): 6.
4. Rosenkranz et al. 2010. *Varroa* Biology and Control. Journal of Invertebrate Pathology 103: S96-S119
5. Boncristiani, H. et al., 2020. Honey bee health world report. Bee World 98: 2-6.
6. Alger et al. 2019. RNA virus spillover from managed honeybees (*Apis mellifera*) to wild bumblebees (*Bombus* spp.). PLoS ONE 14(6): e0217822.
7. Walsh et al. 2020. Queen honey bee pheromone and reproductive behavior are affected by pesticide exposure during development. Behavioral Ecology and Sociobiology, 74: 33.
8. Alger et al. 2018. Home sick: impacts of migratory beekeeping on honey bee pests, pathogens, and colony size. PeerJ, 6:e5812.
9. Leclercq, G. et al., 2018. Bioassays to quantify hygienic behavior in honey bee (*Apis mellifera* L.) colonies: a review. Journal of Apicultural Research, 663-673.
10. Blacquière, T., W. Boot, J. Calis, A. Moro, P. Neumann. and D. Panziera. 2019. Darwinian black box selection for resistance to settled invasive *Varroa destructor* parasites in honey bees. Biological Invasions, 21: 2519-2528.

Textbook (*Recommended*): Caron, D.W. 2013 (revised from 1999). Honey Bee Biology and Beekeeping. Wicwas Press. Cheshire, CT, 368 pp.

Lectures: This is a fully online, Canvas-based course. The website for the syllabus, all lectures, reading materials, announcements, tests, etc. will be posted on eLearning: http://lss.at.ufl.edu. All lectures for this course are narrated presentations and will include videos and supplemental readings. We will provide text from all the narrated presentations, but you should pay close attention, as knowing and understanding the spoken information is critical for success in this course. All lectures and tests will be delivered online in Canvas.

Please note that all video clips and photographs are copyrighted and are NOT to be used outside of this class and may be used only this semester. Please do not copy or distribute these photographs or video clips. All class notes are provided for educational use only.

Course Notifications and Communication: All course communications (assignments, announcements, test information, etc.) will be made via the Announcements in Canvas. Please ensure that your Canvas profile is set to receive notifications (i.e. please check the appropriate box to receive all notifications). To do this, click on your name in the upper right corner of the Canvas homepage after logging into Canvas. Next, click "notifications" on the left. This will take you to the Notification Preferences page. Then, click the check symbol for at least the following notifications: Due Date, Course Content, Announcement, and Grading.

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Students are encouraged to post general questions on topics taught in the class under the General Questions thread. The instructor and/or the TAs will respond to the questions. Other students are also encouraged to respond to the questions. Private questions should be sent to the TAs via e-mail.

Everyone is busy, so please do not expect immediate responses to emails or discussion posts. The instructor and TAs will do their best to respond within 24 hours during the week and 48 hours on weekends. They will also aim to grade assignments within one week of the due date.

Course Schedule: This course is offered via Canvas as a distance education course. To stay on track, students must adhere to the course schedule.

Sample Syllabus

Module	Video Content	Weekly Readings	Module Assessments	Critical Thinking Exercises	Experience with Beekeepers	Extension Blog Post Assignments	Perusall Readings	Extension Video Project
Getting Started	Welcome video; How to be successful in this course	Course syllabus; Tips for success	Jan. 13th					
Honey Bee Research, Extension & Instruction	Honey bee Research; The Research Process; Extension Programs; Examples of Extension; Instruction		Jan. 20th					
Abiotic Colony Stressors and Colony Loss	Abiotic stressors of honey bee colonies; Other stressors; Elevated colony losses	Moritz and Erler, 2016. Steinhauer et al. 2018.	Jan. 27th	Jan. 27th			Jan. 27th	Video Topic Jan. 27th
Integrated Pest Management	What is IPM?; Monitoring (*Varroa*); Determining thresholds; Prevention; Control pyramid; Can IPM be effective for beekeeping?	Textbook: p. 325-330. Jack and Ellis, 2021	Feb. 3rd		RSVP Experience Feb. 3rd	Select Topic Feb. 3rd		
Pests I	*Varroa destructor*; *Varroa* control; *Tropilaelaps*; Tracheal mites	Textbook: p. 309-324. Rosenkranz et al. 2010	Feb. 10th	Feb. 10th			Feb. 10th	
Pests II	Small hive beetle biology; SHB control; Wax moths; Ants; Minor vertebrate pests; Bears	Textbook: p. 345-352.	Feb. 17th					
Honey Bee Pathogens	*Nosema*; Chalkbrood; Viruses; Foulbrood	Boncristiani et al., 2019. Alger et al. 2019	Feb. 24th				Feb. 24th	Production Plan Feb. 24th
African Bees	Origin and movement to U.S.; Biology and behavior; Identification of African bees; What to do about African bees		Mar. 3rd	Mar. 3rd				Peer Review Mar. 3rd
Bee Removal	Types of bee removal; Bee removal safety; Removal best management practices; Practices after bee removal		Mar. 10th			1st Submission Mar. 10th		
	--------- Spring Break ---------							

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Pesticides	Pesticide impacts on bees, Definitions, Routes of exposure; Pesticide regulations; Understanding the label; Pesticide formulations; Risk reduction approaches for applicators; Risk reduction approaches for beekeepers; Recognizing bee exposure and reporting	Walsh et al. 2020	Mar. 24th			Peer Review Mar. 24th		
Commercial Pollination	Moving colonies; State regulations; Hive placement; Grower contracts	Textbook: 289 – 305. Alger et al., 2018	Mar. 31st	Mar. 31st			Mar. 31st	
Queen Production	Choosing breeder queens; Colony preparations; Queen production timeline; Instrumental insemination; Package bee production	Leclercq et al. 2018.	Apr. 7th			Final Submission Apr. 7th		
Other Hive Products	Beeswax; Pollen; Propolis, royal jelly and bee brood; Mead; Apitherapy	Textbook: p. 260-270.	Apr. 14th					
Miscellaneous Topics in Beekeeping	Natural/Treatment-free beekeeping; Honey shows and judging; Observation hives	Blacquière et al. 2019	Apr. 21st	Apr. 21st	Submit All Forms Apr. 21st		Apr. 21st	Final Video Submission Apr. 21st

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Evaluation: The course grade is based on total points earned out of 750 possible points.

Module assessments	15 points each × 13 assessments	195 points
Section critical thinking exercises	50 points each × 5 exercises	250 points
Experience with Beekeepers	75 points	75 points
Select Topic for Blog Post	10 points	10 points
Submission of your peer evaluations of two of your peers' Extension Blog Post	10 points × 2 peer reviews (you get 10 points per peer review you submit)	20 points
Final draft of your Extension Blog Post	100 points	100 points
Perusall reading assignments	10 points × 5 readings	50 points
Extension Video Project	100 points	100 points
	Total Course Points	800 points

Grades and Grade Points
For information on current UF policies for assigning grade points, see catalog.ufl.edu/UGRD/academic-regulations/grades-gradingpolicies/.

FINAL GRADING		
% grade	Letter grade	Points needed to achieve letter grade
100-93	A	≥ 744
90-92	A-	720 – 743
87-89	B+	696 – 719
83-86	B	664 – 695
80-82	B-	640 – 663
77-79	C+	616 – 639
73-76	C	584 – 615
70-72	C-	560 – 583
67-69	D+	536 – 559
63-66	D	504 – 535
60-62	D-	480 – 503
0-59	E	0 – 479

Assignments:

(1) Module Assessments: There is a 15-point assessment associated with each of the thirteen modules in this course. These assessments are ***open note*** (i.e. you ***are*** allowed to use class lectures, books, websites, etc. while taking the assessments). The assessments will be composed of true/false and multiple choice questions. **The assessments 1) open the Saturday morning after the previous section ends, 2) are timed (30 minutes each), and 3) are due on the following Friday at 11:59 pm on the date listed in the course schedule.** These are individual assessments so please do your own work and do not work in groups or share your answers. There is a large bank of test questions for each assessment and the assessment questions are selected randomly for each student. You will receive a 5-point deduction for each day a module assessment is late.

The first module assessment is a syllabus quiz on the "Getting Started" module. You need to read the syllabus and answer quiz questions related to it before you are able to advance to the next module. This quiz will show you how your online assessments will be formatted as well as allow you to demonstrate that you understand how this course works and important due dates.

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(2) Critical Thinking Exercises: The exercises are designed to encourage you to think critically about the content presented in the module lectures. The critical thinking exercises are worth 50 points each. There are separate exercises designed for graduate students incorporating additional questions from the scientific journal articles assigned to that section. These are individual exercises so please do your own work and do not work in groups or share your answers. All of the critical thinking exercises are open note and untimed. You can close and reopen the exercise as many times as you would like until the due date (see course schedule), but you will not be able to make any changes once you have officially submitted your final exercise. **The exercises are due at 11:59 pm on the date listed in the course schedule.** You will receive a 5-point deduction for each day a module assessment is late.

(3) Experience with Beekeepers: Beekeepers rely heavily on one another for information and as such, they often meet in groups to share tips, findings, techniques and practices. This semester, you will have the opportunity to attend some of these beekeeper meetings and/or events. Regardless of which activity(ies) you choose, you must submit documentation of your participation in these beekeeper events. This documentation will include a completed and signed form(s) (to be provided in the assignment page), and a photograph (screenshot) of you at the activity/event.

Your three options:

1) You can attend one full day of Bee College hosted at the University of Florida Honey Bee Research Building (just east of Charles Steinmetz Hall) in Gainesville, FL. On the Friday and Saturday during Spring Break (see the course schedule for the date), we host a large event where beekeepers come from all over Florida to learn about current beekeeping topics, construct beekeeping equipment, work live honey bee colonies, extract honey, etc. Bee College typically begins at about 8:30 am and concludes around 4:30 pm. Participants must wear socks and close-toed shoes. Long sleeve shirts and pants are encouraged. Please do not wear any dark colored clothes (black, navy, etc.). Students may be asked to help keep time for certain classes at the event, but the cost of attendance will be waived.

2) You can choose to attend an all-day beekeeper training event put on by another beekeeping organization or county agriculture-extension group. The springtime is when many different beekeeping clubs and associations around the country begin to hold training events, so no matter where you are located, you can likely find some event for beekeepers. As it will not be a University of Florida-sponsored event, you may be required to pay a fee if you choose this option.

3) You can choose to attend at least **three** beekeeping club or association meetings during the semester. Almost every country, region, state, etc. has a beekeepers' association. The best way to find a beekeeper in your area is do an internet search for "your country/state/region/etc. beekeepers association". For example: "Florida Beekeepers Association," "New Zealand Beekeepers Association," "Jacksonville Beekeepers Association," etc. From the website(s) you find, look for the given association's meeting times and location and attend those meetings. Most clubs and associations meet for about an hour and a half monthly. You can attend three meetings all from the same group or three completely different groups, However, the **UF Honey Bee Club meetings do not count towards this requirement**. At the end of the day, you have the same resources available to find beekeepers in your area that the Instructor and TAs have. Thus, the responsibility of finding a beekeeping club or association lies with the student who elects this option. That said, please contact the Instructor or TA if you need help.

(4) Perusall Reading Assignments: Students enrolled in ENY 6575 are required to read five additional scientific research articles. The idea of these assignments is to expose students to current honey bee research literature in a way that helps them learn by collectively annotating readings in threads, responding to each other's comments, and interacting. There are three questions or tasks associated with each reading and each

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assignment is worth 10 points. To receive full credit, you must respond to each prompt. Remember to be respectful and courteous as you respond to your classmates' posts.

5) Extension Blog Post: One of the most useful skills in any profession is writing. Furthermore, one of the missions of the Land Grant Institution is extension, which means we are communicating with the general public. As such, you are required to produce a blog post which explains the why, where, when and how of a particular beekeeping practice. This blog post should provide a useful resource for beekeepers and be based on peer-reviewed literature. Selected topics should be of interest to beekeepers, meaning it should be relevant to honey bee health, production, treatment, etc. We also want the topics to be specific (Which smoker fuels are unsafe to use?, How to treat your colonies with oxalic acid?, Where you should place your hives?, Why should I register my honey bee colonies with the state?, etc.). Your blog post should be written to have the potential for publication through the University of Florida's extension branch (Cooperative Extension Service). You **must** check with the TA before beginning your blog post so that they can verify that such a blog post does not already exist on your topic. The instructor or TA can provide ideas for selecting a topic, but the topics will be reserved on a first come first serve basis. **A grading rubric will be provided in Canvas to facilitate the development of your blog post.**

Your Extension Blog Post should convey scientific information in a way that a high school student could understand. Your writing should be clear and succinct. **Each Blog Post should be within 800 – 1000 words**. As writing space is limited, figures are extremely helpful in extension documents, and students are encouraged to include as many figures as necessary to explain a topic. You must obtain use permission from the owner of any figures you include in your final report if the figure is not original to you. There will be an additional assignment to submit with the Final Blog Post called "Extension Report Figures and Permissions." For this assignment, you will upload the full-sized .jpeg file for each figure and fill in the accompanying word document with the proof of permission for use.

There are four components of the Extension Blog Post that compose the completed assignment. Due dates for each component are listed in the course schedule.

1) Select Topic Due – The student should identify the topic of their Blog Post by completing the Canvas assignment "Select Blog Post Topic".

2) 1st Submission – This is not a rough draft, but rather is what the student considers the completed document.

3) Peer Review – The 1st submission will be shared with other students in the class who will provide a peer review of the report by the due date listed in the course schedule. Each student will peer review two Extension Blog Posts, providing meaningful helpful comments to receive full points.

4) Final Submission – Students are expected to revise their Extension Blog Posts per the "good" comments provided during the peer review process. The final report must be submitted by the due date shown in the course schedule.

A grading rubric will be provided in Canvas to facilitate development and peer review of the Extension Blog Post. **Five points will be deducted from the final project score every day past the due dates that any of the information requested above is late, regardless of the excuse**. Please do not wait until the last minute to produce your blog post or meet any of the other deadlines. All points lost will be deducted from the final Extension Blog Post grade.

5) Extension Project: Students enrolled in ENY 6575 are required to produce an additional project in the form of an instructional video. All videos should have the potential for publication through the University of

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Florida's extension branch (Cooperative Extension Service). You **must** check with the TA before beginning your project so that they can verify that an instructional video does not already exist on your topic. The instructor or TA can provide ideas for selecting a topic. **A grading rubric will be provided to facilitate development of your extension video.**

Your video should convey a beekeeping practice and/or scientific information in a way that a high school student could understand. If you do not have the technical expertise to perform the beekeeping tasks in the video, the Instructors or course TAs will be available to help if planned in advance. Members of the UF Honey Bee Research and Extension Laboratory can be available to help with the beekeeping practices demonstrated in the video. You must obtain written permission from any person appearing in the video. There will be an additional assignment to submit with the Final Extension Video called "Extension Video Permissions." For this assignment, you will upload the signed consent forms for each person in the video.

Videos should be 2-5 minutes in length and provide useful information to U.S. beekeepers. You will write a draft and a production plan for others to peer review that will be evaluated using a different rubric. The video needs to be of excellent quality; thus, you will have access to good equipment from the UF Honey Bee and Research Extension Laboratory. The video of course does not have to be a masterpiece, but it should be professional enough that it can be published on our lab YouTube channel. Here are two examples of videos produced by student in previous classes https://youtu.be/urDsKwHPAV0 https://youtu.be/U6HyBbs9454.

There are four components of the extension video project that compose the completed assignment. Due dates for each component are listed in the course schedule.

a) Video Topic Due – The student should identify and record the topic chosen for the extension report by completing the Canvas assignment "Extension Report Topic."

b) Production Plan – This is not a rough draft, but rather is what the student considers the well-thought out production plan. We want to know locations where the filming is to take place, the planned script of those appearing in the video, the angles and views you plan to capture and any words that might appear on the screen at any time.

c) Peer Review – The production plan will be shared with other graduate students in the class who will provide a peer review of the report by the due date listed in the course schedule. Each student will peer review two production plans. This activity is new for most students, but provide the best feedback you can.

d) Final Submission – Students are expected to revise the production plan per the comments provided during the peer review process. The final video must be submitted by the due date shown in the course schedule.

A grading rubric will be provided in Canvas to facilitate development and peer review of the Extension Video Project. **Five points will be deducted from the final project score every day past the due dates that any of the information requested above is late, regardless of the excuse**. Please do not wait until the last minute to produce your blog post or meet any of the other deadlines. All points lost will be deducted from the final Extension Video Project grade.

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/UGRD/academic-regulations/attendance-policies/

Online Course Evaluation Process: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on

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how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/.

Academic Honesty: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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." The Honor Code (sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Services for Students with Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, 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.

Campus Resources:

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact mailto:umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit counseling.ufl.edu/ or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit shcc.ufl.edu/.

University Police Department: Visit police.ufl.edu/ or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; ufhealth.org/emergency-room-trauma-center.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services career.ufl.edu/.

Library Support: cms.uflib.ufl.edu/ask various ways to receive assistance with respect to using the libraries or finding resources.

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Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring. teachingcenter.ufl.edu/

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers. writing.ufl.edu/writing-studio/

Student Complaints On-Campus: sccr.dso.ufl.edu/policies/student-honor- codestudent-conduct-code/

On-Line Students Complaints: distance.ufl.edu/student-complaint-process/

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