

**Course Title:** Plant Nematology - Fall 2022

**Course ID and type:** NEM 5707, Web-based course

**INSTRUCTOR:**

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**ABOUT THE COURSE**

**Course Description:**

This is a distance education course offered via the University of Florida E-learning in Canvas. The class materials including narrated PowerPoint lectures, reading materials, educational videos, assignments, discussions, quizzes, and examinations are available online through Canvas.

**Credit Hours:** 3 credits

**Prerequisite:** None.

**Semester Course Offered:** Offered fall semester every year.

**Class days:** Lectures are available to review on Tuesday and Thursday of each week.

**Course Objectives:**

The overall aim of this course is to provide an overview of plant nematology with an emphasis on diseases caused by plant-parasitic nematodes. Basic knowledge of nematology that will be covered includes nematode morphology and anatomy. Identification and biology of nematodes, interactions of plant-parasitic nematodes with plants and other pathogenic microorganisms, and important groups of plant-parasitic nematodes will be discussed. General control strategies to manage plant-parasitic nematodes will also be discussed.

**Learning outcomes:**

By the end of this course, the student will be able to a) define nematodes and describe their morphology and anatomy, b) understand nematode biology and life cycle, c) understand how plant-parasitic nematodes interact with host crops and cause infection, d) identify and differentiate common plant-parasitic nematodes based on morphology and damage symptoms, e) recognize plant-parasitic nematodes of economic importance, and f) understand different management approaches to control plant-parasitic nematodes.

## **Course Outline:**

### **Module 1. Introduction**

- i. What are nematodes?
- ii. History of nematology science
- iii. Major groups of nematodes based on their habitat

### **Module 2. General morphology and anatomy of nematodes**

- i. Morphology and anatomy
- ii. Body wall
- iii. Digestive system
- iv. Reproductive system
- v. Nervous system

### **Module 3. Nematode parasitism**

- i. Nematode parasitism of plants
- ii. Feeding behavior of nematodes

### **Module 4. Plant-nematode interaction**

- i. Damage symptoms
- ii. Disease complex

### **Module 5. Nematode sampling and identification**

- i. Soil sampling and nematode extraction
- ii. Nematode taxonomy
- iii. Morphological and molecular identification

### **Module 6. Plant-parasitic nematodes - Sedentary endoparasites**

- i. Root-knot nematodes (*Meloidogyne*)
- ii. Cyst nematodes (*Heterodera*, *Globodera*)
- iii. Citrus nematode (*Tylenchulus*)
- iv. Reniform nematode (*Rotylenchulus*)
- v. False root-knot nematode (*Naccabus*)

### **Module 7. Plant-parasitic nematodes - Migratory endoparasites**

- i. Lesion nematodes (*Pratylenchus*)
- ii. Borrowing nematode (*Radopholus*)
- iii. Lance nematodes (*Hoplolaimus*)

## **Module 8. Plant-parasitic nematodes - Ectoparasites**

- i. Dagger and needle nematodes (*Xiphinema*, *Longidorus*)
- ii. Stubby-root nematodes (*Trichodorus*, *Nanidorus*)
- iii. Sting, stunt, and awl nematodes (*Belonolaimus*, *Tylenchorhynchus*, *Dolichodorus*)
- iv. Ring, sheath, pin nematodes (*Criconematids*, *Hemicycliophoroidea*, *Paratylnchus*)
- v. Spiral nematodes (*Helicotylenchus*, *Scutellonema*)

## **Module 9. Foliar, vascular, and stem nematodes**

- i. Stem, tuber, and bulb nematodes (*Ditylenchus*)
- ii. Foliar nematode (*Aphelenchoides*)
- iii. Seed/shoot gall nematodes (*Anguina*)
- iv. Pinewood and red ring nematodes (*Bursaphelenchus*)

## **Module 10. General nematode management**

- i. Principles of nematode control
- ii. Cultural control
- iii. Chemical control
- iv. Biological control
- v. Plant resistance

**Reading materials:** Course modules are supplemented with relevant materials and articles from current literature and educational links to websites. All required materials will be posted on the canvas. Questions from reading materials may be on the weekly quizzes and assignments. Students are also encouraged to participate actively in weekly discussions of the class. The following reading resources are not required but they are suggested to complete some assignments and discussions.

1. Perry R.N. and Moens, M. Plant Nematology. 2013. 2<sup>nd</sup> Edition. CABI Publishing: Wallingford, UK. 542 pages. ISBN: 978-1-78064-151-5
2. Nickle. W. R. 2020. Manual of Agricultural Nematology. Taylor & Francis publishing. 1052 pages. ISBN: 9780367402976
3. Chen, Z., Chen, S., and Dickson, D. 2004. Nematology: Advances and Perspectives: Vol II: Nematode Management and Utilization. CABI publishing. 608 pages. ISBN: 9780851996462
4. Donald L Lee. 2002. The biology of nematodes. CRC press. 635 pages. ISBN-10: 0415272114

## **Grading System:**

The grading system for this course is based on a maximum of 500 points and is determined by the percentage breakdown shown below. Two examinations will be administered. One is scheduled at approximately midterm and the other at the end of the semester. Throughout the

semester, students will be given several timed quizzes and homework assignments based on the online lectures and readings. These assignments will be submitted to the discussion board for comment, critique, and questioning. A term paper is required on a topic chosen by the student and approved by the instructor.

<b>NEM 5707</b>	<b>Numbers of Activity</b>	<b>Point Value</b>	<b>Total</b>
Discussions	5	10 each	50
Assignments	5	10 each	50
Quizzes	4	10 each	40
Term paper	1	100 each	100
Peer-review of term paper	1	20 each	20
Midterm exam	1	80	80
Final exam	1	160	160
<b>Total</b>			<b>500</b>

The grading scale (%) and points needed to achieve a grade for this course are as follows:

<b>Grade</b>	<b>Percentage</b>	<b>Points</b>
A	94-100	475-500
A-	<94-90	450-474
B+	<90-87	425-449
B	<87-84	400-424
B-	<84-80	350-399
C+	<80-77	300-349
C	<77-74	250-299
C-	<74-70	200-249
D+	<70-67	150-199
D	<67-64	100-149
D-	<64-60	50-99
E	<60	<50

More information on UF's grading policies can be found at:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

## Assess student learning:

### Discussions

- There are a total of 5 discussion questions in this course (see table below).
- The discussion format provides an opportunity for each student to share ideas and knowledge and get feedback from other students and instructors in the class.
- The use of supplemental course materials and other reliable sources is encouraged and often required for completion. Be sure to cite your sources appropriately.
- These are also an opportunity for students to relate the course material to personal experience in their research or position.
- They will always be **due on Saturday by midnight**.
- To receive full credit, respond to 2 of your classmate's posts with a substantive reply.
- No extension for doing the discussion is accepted.

### Assignments

- There is a total of 5 assignments in this class (see table below).
- These assignments draw from the concepts presented in lectures. Again, the use of supplemental course materials, and other reliable sources is encouraged and often required for completion. Be sure to cite your sources appropriately.
- They will always be **due on Saturday by midnight**.
- Extension for submitting the assignments is accepted upon request, but 10% points will be deducted per day.

### Quizzes

- There are a total of 4 quizzes for this class (see table below).
- These are multiple-choice or short-answer questions.
- They will always be **due on Saturday by midnight**.
- These are closed books, notes, and internet resources.
- **Time limits are imposed** and only the content entered CANVAS will be graded.

### Term paper

- There is one term paper for this class.
- The term paper provides an opportunity for students to present their own evaluation or interpretation of a Plant Nematology topic.
- Each student should choose a nematode of agricultural importance and find 5 or more resources that address recent advances in the biology or management of such nematodes. The use of resources published after 2012 is highly recommended. Each student should

**get approval from the instructor** on the nematode selected before working on the literature review paper.

- The literature review paper must be submitted as a Word document (12-pt font, single-spaced, 1-inch margins).
- Length of term paper must be at least 2000 words, not including the references (citations).
- All the materials used should be cited in the text and references should be listed.
- Each paper is **peer-reviewed by another student** (your classmate) selected by the instructor, and points for the quality of evaluation are given.
- Each student is given the opportunity to modify the paper based on the feedback received by the reviewer.
- Due dates for topic selection and submission of the initial and final draft of the paper and peer-review of the paper are given in the table below.
- No extension for submitting the initial and final drafts of the term paper is accepted.

### Exams

- There will be a midterm and a final exam (see table below).
- Exams will be open for 24 hours on the day that they are assigned.
- Both the midterm and final exams are cumulative.
- These are closed books, notes, and internet resources.
- **Time limits are imposed** and only the content entered CANVAS will be graded.

Week	Class date	Topic – Presentation #	Assignment/Discussion/Quiz/Term paper
1	Aug. 25, 2022	Course overview – 1	Discussion 1
2	Aug. 30, 2022	Nematology history and nematode habitat – 2	Assignment 1
	Sep. 1, 2022	Nematode morphology – 3	
3	Sep. 6, 2022	Nematode body pattern – 4	Discussion 2
	Sep. 8, 2022	Nematode digestive system – 5	
4	Sep. 13, 2022	Nematode reproductive system – 6	Assignment 2
	Sep. 15, 2022	Nematode nervous system – 7	
5	Sep. 20, 2022	Nematode parasitism of plants – 8	Quiz 1 (from Modules 1 and 2)
	Sep. 22, 2022	Aboveground damage symptoms – 9	
6	Sep. 27, 2022	Belowground damage symptoms – 10	Discussion 3
	Sep. 29, 2022	Disease complex – 11	
7	Oct. 4, 2022	Nematode sampling and identification – 12	Quiz 2 (Modules 3 and 4)

	Oct. 6, 2022	Nematode classification – 13	
8	Oct.11, 2022	<b>Midterm exam</b>	Assignment 3
	Oct. 13, 2022	Root-knot nematodes – 14	
9	Oct.18, 2022	Root-knot nematodes –15	Discussion 4
	Oct. 20, 2022	Cyst nematodes – 16	
10	Oct. 25, 2022	Cyst nematodes – 17	Assignment 4  Topic for term paper chosen by the student and approved by the instructor.
	Oct. 27, 2022	Cyst nematodes – 18	
11	Nov. 1, 2022	Citrus, reniform, and Naccabus nematodes –19	Quiz 3 (Modules 5 and 6)
	Nov. 3, 2022	Lesion nematode – 20	
12	Nov. 8, 2022	Borrowing and lance nematodes – 21	Discussion 5
	Nov. 10, 2022	Dagger, needle, and stubby-root nematodes – 22	
13	Nov.15, 2022	Sting, stunt, and awl nematodes – 23	Assignment 5
	Nov. 17, 2022	Criconematide, pin, and spiral nematodes – 24	
14	Nov. 22, 2022	No class (Holiday)	The initial draft of the paper is due on Nov. 27 by midnight.
	Nov. 24, 2022	Holiday	
15	Nov. 29, 2022	Stem, foliar and gall nematodes – 25	Quiz 4 (Modules 7 and 8)  Review your classmate’s term paper is due on Dec. 4 by midnight.
	Dec. 1, 2022	Pinewood and red ring nematodes – 26	
16	Dec. 6, 2022	Nematode management – 27	Final draft of the paper is due on Dec. 9 by midnight.
	Dec. 8-9, 2022	<b>Reading days</b>	
17	Dec. 10-16, 2022	<b>Final exam</b>	

### 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.

<https://catalog.ufl.edu/UGRD/previous-catalogs/2021-2022/UGRD/academic-regulations/attendance-policies/#:~:text=The%20university%20recognizes%20the%20right%20of%20the%20instructor,subsequently%20assign%20a%20failing%20grade%20for%20excessive%20absences>

## **Academic Honesty**

In 1995 the UF student body enacted an honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

The Honor 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.

On all work submitted for credit by students at the university, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office. (*Source: 2012-2013 Undergraduate Catalog*)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously always upheld in this course.

## **Software Use**

All faculty, staff, and students at 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.

## **Academic 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: <https://counseling.ufl.edu/>
- E-learning technical support: Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu)
- Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring
- Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services



- Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- Library Support: Various ways to receive assistance with respect to using the libraries or finding resources
- On-Line Students Complaints: <https://distance.ufl.edu/state-authorization-status/>
- Student Complaints On-Campus: <https://sccr.dso.ufl.edu/process/student-conduct-code/>

### **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.

<https://www.ufl.edu/?s=Services%20for%20Students%20with%20Disabilities%20>