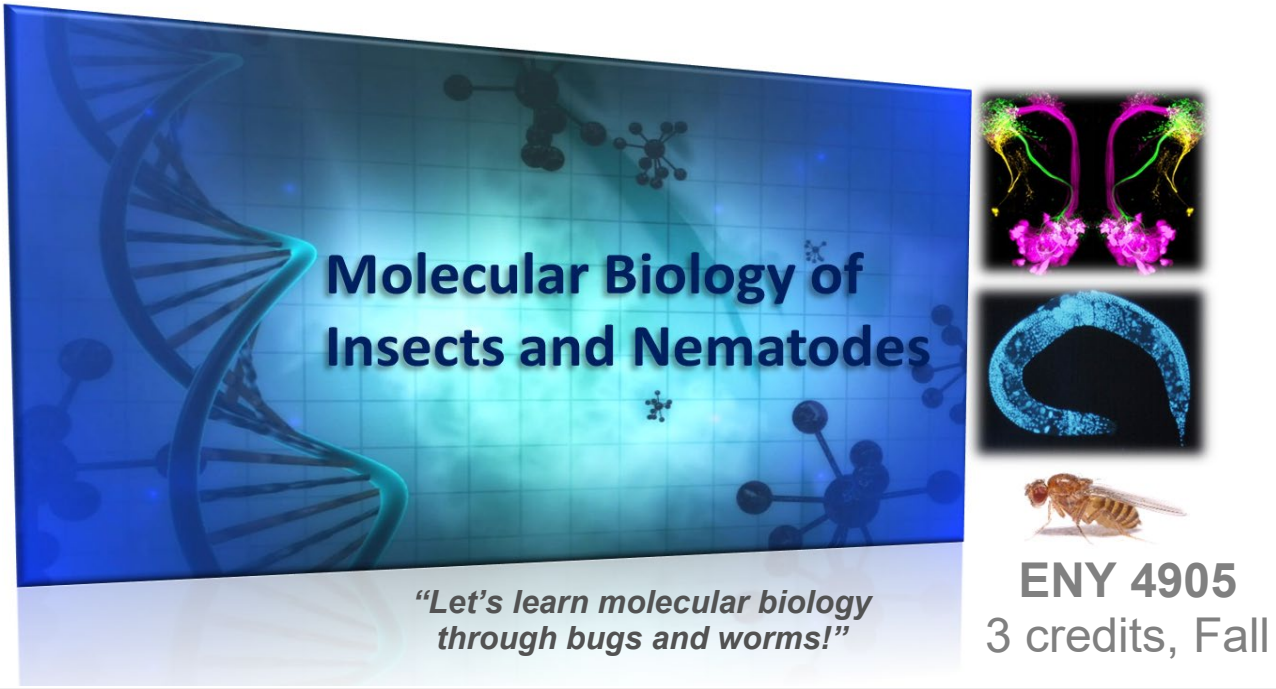

Overview

Course Description

Through this course, students will acquire: 1) **foundational knowledge** of molecular biology, with emphasis on scientific discoveries from insects and nematodes, 2) information on the **current innovations and trends** of molecular technologies (e.g. high throughput sequencing, genome editing by CRISPR). Class lectures will be complemented by case studies, games, tutorial videos, interactive discussion, and group debates.

What is special about this course?

Do you know that …

- An insect (*Drosophila melanogaster*) and a nematode (*Caenorhabditis elegans*) have contributed to numerous groundbreaking discoveries and generated 15 Nobel laureates in the past century?
- Our knowledge of how cells develop into tissues, how innate immune system works, and how genes may affect behaviors such as smell, taste, even sleep, were profoundly advanced by studies on insects or nematodes?
- Scientists are constantly leveraging molecular tools to study and to control pests and disease vectors?

If your answer is "no" to any of the questions, or, if you are simply intrigued by the idea of studying molecular biology from an entomo- or nemato- logical perspective, **this course may be ideal for you!**

Learning Objectives

Upon completion of the course, students will be able to:

- List 5 breakthrough discoveries from research on *Drosophila melanogaster* and *Caenorhabditis elegans*.
- Explain the strengths and limitations of different model organisms in research.
- Describe the working principles of common molecular techniques to study DNA, RNA, and proteins.
- Explain the differences between genomics, proteomics and metabolomics.
- Summarize genetic techniques used in insect or nematode studies.
- Compare and contrast high throughput sequencing technologies.
- Evaluate omics data using basic multivariate statistics.
- Construct and execute nucleic acid sequence identification using a BLAST search.
- Propose solutions to common issues encountered in nuclei acid extraction, PCR, and Sanger sequencing.

Instructors

Dr. Adam CN Wong
Room 3105, Steinmetz Hall, Bldg. 970, Natural Area Drive
352-273-3977
adamcnwong@ufl.edu

Class period

Monday and Wednesday Period 6 - 7 (12:50 PM - 2:45 PM)
Lectures
Monday: 3118 Steinmetz Hall; Wednesday: 2216 Steinmetz Hall.
Office hours
Immediately after class and by email appointment.

Prerequisite

There is no formal prerequisite for this course. However, basic knowledge of biology obtained from a college-level course is highly recommended.

Readings:
Recommended Textbook

- Marjorie A. Hoy: Insect Molecular Genetics: An Introduction to Principles and Applications (4th Edition).
  EBook is available from the UF library for students: Go to: https://guides.uflib.ufl.edu/ebooks and search the book under Library Catalog.

Other readings and links to tutorial videos will be posted in the course Canvas website.

Fall Schedule (tentative)

Week	Topic	Active learning exercises	Online quiz?
Week 1 August 21	**Share your favorite insect/nematode research news!**	Self intro and news sharing	-
Week 2A August 26	**DNA, RNA, and protein**	A genome size guessing game	-
Week 2B August 28	**Mechanisms of gene regulation**	A movie clip followed by discussions	Y
Week 3A Sept 2	Holiday		
Week 3B Sept 4	**Genotype and phenotype (Part 1)** • Sex determination • Dosage compensation	Pictionary game	-
Week 4A Sept 9	**Genotype and phenotype (Part 2)** • Epigenetics	-	-
Week 4B Sept 11	**Model insect in research - Drosophila melanogaster (Part 1)** • Introduction to fly genetics	Journal paper discussion	Y
Week 5A Sept 16	**Model insect in research – Drosophila melanogaster (Part 2)** • Host-microbiome interactions • Translating to agricultural pests	-	-
Week 5B Sept 18	**Guest seminar on *Drosophila* melanogaster research** • Diego Rincon-Limas (Department of Neurology)	Research tool demo	Y
Week 6A Sep 23	Pre-exam discussions, Q&A		
Week 6B Sept 25	1st exam		
Week 7A Sept 30	**Model nematode in research – C. elegans** • *A introduction by Peter Digennaro (Nematology)*	-	-

Week 7B Oct 2	**Discoveries from other invertebrate systems**	Journal paper discussion	Y
Week 8A Oct 7	**Molecular techniques (Part 1)** • PCR, qPCR, cloning, Sanger sequencing, Western blot.	Case Studies	-
Week 8B Oct 9	**Molecular techniques (Part 2)** • RNAi and CRISPR	Tutorial videos	Y
Week 9A Oct 21	**Introduction to high-throughput sequencing (Part 1)** • Sequencing technologies • Experimental design and concept of multiplexing	Case Studies, tutorial videos	-
Week 9B Oct 23	**Introduction to high-throughput sequencing (Part 2)** • Multivariate statistics	Case Studies, tutorial videos	Y
Week 10A Oct 28	Pre-exam discussions, Q&A		
Week 10B Oct 30	2nd exam		
Week 11A Nov 4	**Mass spectrometry-based omics** • Metabolomics and Proteomics	Tutorial videos, games	-
Week 11B Nov 6	**Guest seminar an omics topics** • TBD	-	Y
Week 12A Nov 11	Holiday		
Week 12B Nov 13	**Navigating big data – class exercise 1** • Amplicons sequences • Metabolomes • Comparative genomics	Group workshop	-
Week 13A Nov 18	**Navigating big data – class exercise 2** • Comparative genomics	Group workshop	-
Week 13B Nov 20	**Applications of molecular biology in pest management**	Case Studies, tutorial videos	Y
Week 14A Nov 25	**Group debate**	Debate	-
Week 14B Nov 25	Pre-exam discussions, Q&A		
Week 15A Dec 2	General feedback on the course		
Week 15B Dec 4	3rd exam		

Course Policies

Grading

This course will be graded on the following scale:

A	93-100
A-	90-92.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.9
C	73-76.9
C-	70-72.9
D	60-69.9
D-	50-59.9
E	<50

	Point amount	Grade percentage
Exams (3 in total)	300 in total (100 each)	30
Quizzes (8 in total)	80 in total (10 each)	20
Group Debate (1 in total)	20	20
Short assay (500 words)	60	20
Share a news at week 1 class	5	5
Attended the session at week 15A and give feedback to the course	5	5
Total		100

For information on current UF policies for assigning grades, please visit:
Current website: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

General Class Rules

- Keep electronic devices in silence mode during lectures and lab exercises.
- Discussions about grades or other personal matters should be addressed during office hours.

Absences and Make-Up Work

Attendance is required. If you miss class, you are responsible for getting notes from other classmates.
University policy for class attendance and make-up exams, assignments and other work can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Class Attendance and Online quizzes

Each lecture class will be 1 hour long, except for guest lectures that will be 45 mins long, followed by 15-min Q and A. There will be 8 quizzes posted on Canvas on Wednesdays of specific weeks (indicated in the fall schedule table) to help students reinforce course materials and learning. Quizzes will be open book, consisting of 10 multiple choices, true/false, and fill in the blank questions. Quizzes will be due by Friday 5pm EST of the same week the quiz is posted.

Short essay

Students will come up with their own topics of insect/nematode molecular biology and write 500-word short assays, due on Friday 5pm EST of week 11. A grading rubric is attached.

Group debate

There will be a group debate exercise toward the end of the course. An instruction and grading rubric will be posted in Canvas 2 weeks prior to the exercise. Students will be divided into 3 groups – two debating teams and a group of judges. Each debating team will have 10 minutes to present their arguments in support of their position statement. After both teams have presented, they will have 5 minutes to come up with questions/criticisms to challenge each other. Each team will take turns to raise questions/criticisms, followed by answers/rebuttal from the opposing team. Each judge will provide a 5-minute feedback. Debating teams can decide whether they want to respond to judge comments before the judges cast their votes. A key component of this exercise is peer assessment. Debating teams will be graded by the judges and instructor. Judges will be graded by the students for their in-class feedback and will have to submit a 1-page summary within 3 days by 5pm EST after the debate to be graded by the instructor.

Exams

There will be 3 exams in week 6, week 10, and week 15. The exams will be in class, non-open book and non-cumulative. Exam papers will consist of 20 multiple-choice questions, 5 short answer questions (7 to choose from), and 2 long answer questions (3 to choose from).

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Academic Integrity and Class Rules

Each student in the course is expected to abide by the UF Code of Academic Integrity. For information, please visit: https://sccr.dso.ufl.edu/students/student-conduct-code/

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:
http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

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.

Additional Resources

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 requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc

Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general wellbeing 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 Groups and Workshops Outreach and Consultation Self-Help Library Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu/
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Student Complaints

- Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
- Online Course: http://www.distance.ufl.edu/student-complaint-process.

Short assay grading rubric

Student name:
Title of the review:

Category	Scoring Criteria	Total Points
Content (20%)	Topic/question of the assay is clearly defined.	/10
	Conclusions are supported by evidence covered in the essay	/10
Organization (10%)	Ideas are arranged logically and the reader can easily follow the essay.	/10
Delivery (10%)	Writing is crisp, clear, and succinct. Meaning is explicit.	/10
Format and Style (15%)	Correct grammar and no typos throughout the paper.	/5
	Include headers (student name, title of the review), page numbers and follow the general rules stated in Canvas.	/5
	Between 450-500 words.	/5
Citations/references (5%)	References are primarily peer-reviewed professional journals or other legitimate sources.	/5
	Total Points (out of 60)	