

Omics in Entomology/Nematology Research
ENY 6934, 1 credit (seminar course)
Summer C

Instructor: Dr. Adam CN Wong
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Class period: Thursday, 12:50 – 2:45pm

Room: 1027 Steinmetz Hall and by Zoom (link TBD)

Office hours: Immediately after class and by appointment

Course Description:

Current issues. Subject matter variable, may be repeated with different subject each time.

What is omics?

Omics refers to the study of organisms utilizing a range of high throughput technologies that measure molecular features at a large scale, e.g. genomics, proteomics or metabolomics (all genes, proteins or metabolites and their relationships). It involves extensive use of bioinformatics and statistical tools to analyze the data. The rise of omics technologies is a science revolution as it greatly accelerates research discoveries and inventions.

Overview:

This course is intended for students who are interested in omics but have limited experience, or students who want to refresh their knowledge in omics technologies, experimental design and big data management. The classes will be largely interactive small group discussion along with lectures from guest speakers who are experts in conducting different omics experiments. During the course, students will have the opportunity to give oral presentations on specific omics topics.

Learning Objectives:

By the completion of this course students should be able to:

- Define the different terms used in omics.
- Describe the working principles of omics techniques.
- Explain the advantages and limitations of different high throughput sequencing platforms.
- Critique different research methods used in omics studies.
- Deliver scientific presentations and handle audience questions.
- Provide constructive feedback to peers in a professional manner

Prerequisites:

No prerequisite courses. As this is a graduate course, however, you are expected to have basic working knowledge of biology equivalent to an introductory course in biology or entomology.

Required Readings:

Topic-specific readings associated with each week's subject will be posted online in Canvas (<https://lss.at.ufl.edu/> - click on e-Learning in Canvas). The initial list of publications below provide general Omics background information and should be read in the first two weeks of the course, with subsequent 1 articles to follow:

1. Vandereyken, Katy, et al. 2023. "Methods and applications for single-cell and spatial multi-omics." *Nature Reviews Genetics* 24.8: 494-515.
2. Reel, Parminder S., et al. 2021. "Using machine learning approaches for multi-omics data analysis: A review." *Biotechnology Advances* 49: 107739.
3. Paliy, O. and Shankar, V. 2016. Application of multivariate statistical techniques in microbial ecology. *Molecular Ecology*, 25: 1032-1057.

Course structure

Each class will comprise a 30-minute seminar by the instructor, student, or guest speakers on relevant literature, followed by Q&A and group discussions. It is ESSENTIAL that students read the assigned reading materials before coming to class. All graduate student participants are expected to attend each seminar and to contribute substantially to the discussions each week.

Student presentations. Student presentations begin after the first few weeks of the semester. Each student will choose a topic for presentation within the first two weeks and we will then finalize the schedule for the rest of the semester. Students will have two roles: presenter of a topic and contributor to discussions. **Presenters** will deliver a 30-minute PowerPoint presentation on an omics topic, followed by a 10-minute Q&A. Each student-led discussion and presentation class will have up to two students presenting. The exercise will be peer-assessed. After each student presents, all student **contributors** in the class will complete an evaluation of the presentation and turn it in before the end of class. The evaluation rubric will be the same rubric used by the Entomological Society of America in judging student presentations during conference competitions (see below).

Pre-presentation preparation. Each student presenter should conduct a literature review on a topic of their choice after consulting with the seminar organizer. One week prior to presenting the seminar, the student should submit a 1-2 page overview of the chosen topic to the seminar participants and assign one to two of the most important references to the class (sent as pdf files). The overview should include a list of 5-10 of the most important references so that fellow students may follow up on the topic.

Presentation Content. Presentation content should include a general introduction to the topic and an in-depth explanation of methods, relevance, application, etc. Visuals should be included in the presentation to effectively communicate important messages. The presentation should include critical analyses of the scientific methods used to investigate the topic and improvements needed, gaps in knowledge, ideas about how to fill those gaps, relevance to other entomological research, etc.

Presentation Delivery. On the day of the presentation, the student is responsible for setting up their visual aides (PowerPoint, blackboard information, posters, printouts, etc.). The presentation should be 30 minutes long and provide a general overview of the topic and highlight its relevance today. The evaluation rubric should be considered when developing the presentation. Following the presentation, the presenter is responsible for leading a discussion in which they are expected to contribute their ideas, experiences, critical analysis of the topic selected, and guide discussion among all class participants.

Contributors should come to class prepared for discussion by having read materials provided, and with 3-5 questions about the subject, prepared in advance (these will be submitted after each presentation). Each student must complete an evaluation (see rubric below) of each presentation made by other students, with professional and constructive feedback, and must actively contribute to class discussion.

Professional behavior in the classroom:

- Respect the instructors and guest lecturer; call them by their title (e.g. Dr Wong).
- Keep cell phones on silent mode during lectures and discussions.
- Provide feedback in a courteous and constructive manner. This is a discussion course and agreeing / disagreeing respectfully is an essential part of the course goals!

Course Schedule*

Week	Topic	Activity
1	Meet and greet, course introduction	Icebreaking game
2	High throughput sequencing	Terminology game
3	Genomics, Transcriptomics, and Epigenomics	Lecture and discussion
4	Proteomics and Metabolomics	Lecture and discussion
5	Guest speaker	Lecture and discussion
6	Single-cell and spatial multi-omics	Lecture and discussion
7	AI and data science tools	Lecture and discussion
8	Student Presentations	Student-led presentation and discussion
9	Student Presentations	Student-led presentation and discussion
10	Student Presentations	Student-led presentation and discussion
11	Student Presentations	Student-led presentation and discussion
12	Student Presentations	Student-led presentation and discussion
13	Final student presentation and general feedback session	Student-led presentation and discussion

* This schedule is tentative and may be changed as needed during the semester

Assignments and Grade points:

Final grade of the course will be calculated as follows:

Assignment	Points possible	% of grade
Presentation preparation - Readings - Overview - Timely communication	20	20%
Presentation - content	20	20%
Presentation - delivery	20	20%
Peer evaluation of student presentations	15	15%
Weekly questions	15	15%
Discussion participation	10	10%
TOTAL	100	100%

Grading scale:

A	93-100% of total points
A-	90-92.9% of total points
B+	87-89.9% of total points
B	83-86.9% of total points
B-	80-82.9% of total point
C+	77-79.9% of total points
C	73-76.9% of total points
C-	70-72.9% of total points
D	60-69.9% of total points
E	<60% of total points

Grades and Grade Points.

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

Attendance and Make-Up Work

Attendance is required. Requirements for class attendance and make-up exams, assignments and other work

are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>. If you miss class, you are responsible for getting notes from other classmates.

Accommodations for Students with Disabilities:

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. See the “Get Started With the DRC” webpage on the Disability Resource Center site at <https://disability.ufl.edu/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester.

In-Class Recording:

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal education use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and deliver by an instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentation such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private 3 Revised: September 2024 conversations between students in the class or between a student and the faculty or guest lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless, of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Online course evaluation:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

1. The email they receive from GatorEvals,
2. Their Canvas course menu under GatorEvals, or
3. The central portal at <https://my-ufl.bluera.com>

Guidance on how to provide constructive feedback is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at <https://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 Conduct Code specifies a number of behaviors that are in violation of this code and the 4 possible sanctions. See the UF Conduct Code website for more information: <https://sccr.dso.ufl.edu/process/student-conduct-code/>. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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). 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: (<https://policy.ufl.edu/regulation/4-040/>).

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 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.

Whole Gator App and website connects UF students with resources dedicated to supporting overall health and well-being. In addition to many of the resources below it also has strategies to practice self-care. See <https://one.ufl.edu/whole-gator/topics>.

Health and Wellness

- U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website at <https://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 the Counseling and Wellness Center website at <https://counseling.ufl.edu/> or call 352-392-1575 for information on crisis services as well as noncrisis services.
- Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website at <https://shcc.ufl.edu/>.
- University Police Department: Visit UF Police Department website at <https://police.ufl.edu/> or call 352392-1111 (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; Visit the UF Health Emergency Room and Trauma Center website at <https://ufhealth.org/locations/uf-health-shands-emergency-room-trauma-center/>.
- GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website at: <https://gatorwell.ufsa.ufl.edu/> or call 352-273- 4450.
- Student Success Initiative, <http://studentsuccess.ufl.edu>.

Academic Resources

- E-learning technical support: Contact the UF Computing Help Desk at 352-3924357 or via e-mail at helpdesk@ufl.edu.
- Career Connections Center, <https://career.ufl.edu/>: Reitz Union Suite 1300, 352-392- 1601. Career assistance and counseling services.

- Library Support, <https://cms.uflib.ufl.edu/ask>: Various ways to receive assistance with respect to using the libraries or finding resources. Call 866-281-6309 or email ask@ufl.libanswers.com for more information.
- Teaching Center, <https://umatter.ufl.edu/office/teaching-center/>: 1317 Turlington Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- Writing Studio, <https://writing.ufl.edu/writing-studio/>: Daytime (9:30am-3:30pm): 2215 Turlington Hall, 352-846-1138 | Evening (5:00pm-7:00pm): 1545 W University Avenue (Library West, Rm. 339). Help brainstorming, formatting, and writing papers.
- Academic Complaints: Office of the Ombuds; Visit the Complaint Portal webpage for more information at <https://www.ombuds.ufl.edu/complaint-portal/>.
- Enrollment Management Complaints (Registrar, Financial Aid, Admissions): View the Student Complaint Procedure webpage for more information at <https://www.ombuds.ufl.edu/complaint-portal/>.

Student Complaints:

- Residential Course: <https://www.ombuds.ufl.edu/complaint-portal/>

Student Presentation evaluation rubric (based on the Entomological Society of America criteria)

	Pts. Possible	Category evaluated	Points awarded and notes
Content 55%	5	Title is concise, informative, and relevant for presentation content; <i>judge title given on day of presentation, not what is listed in online program</i>	
	10	Introduction and background with pertinent literature cited	
	10	Objectives or hypotheses clearly stated and concise / Objectives of course design or teaching/extension program clearly stated and concise with learning gaps and target audience(s) identified	
	10	Materials and methods (study design) clear, concise, and appropriate to problem / Course or program design development and relevant evaluation metrics clear, concise, and appropriate for the learning gaps and audience(s)	
	10	Interpretation of results (actual or potential/proposed) and analysis (current or proposed) clear, concise, and accurate and addresses needs of target audience	
	10	Significance of results (actual or potential/proposed) to field of study or teaching community and targeted audience clearly discussed	
Presentation 45%	5	Logical order; minimum redundancy	
	5	Smooth transitions between presentation slides and sections	
	10	Slides use appropriate fonts, font sizes, high contrast images (for example, avoiding color schemes that are hard to distinguish for colorblind participants like red/green). Individual style and creativity are expressed.	
	5	Slides have no grammatical errors and are not excessively wordy	
	10	Effective use & description of visuals (i.e. photos, diagrams, figures, and tables); <i>do they support the presentation narrative?</i>	
	5	Appropriate volume (uses microphone if available) & speed of speech; clear communication; <i>please note, score should not be dependent on audio equipment</i>	
	5	Effective use of time; <i>30 minutes with appropriate balance across presentation sections, with time to field audience questions effectively</i>	