



Meets: Tuesdays and Thursdays: 1:55 – 4:55 pm (2 Undergraduate Credits)

Location: Blueberry Building Teaching Lab ([BLRB 152](#)); class requires physical presence

Pre-requisites: AGR 3303 or PCB 3063 - Genetics, and HOS 3305 - Introduction to Plant Molecular Biology, or Permission from Course Coordinator

Instructors (Horticultural Science Department):

Kelly Balmant (Coordinator) Fifield Hall, Room 2211; 352-294-7546, balmant@ufl.edu

Cătălin Voiniciuc Bldg. 885, 0003B; 352-273-4782, cvoiniciuc@ufl.edu

Gabriel Saraiva (Teaching Assistant), gabriel.saraivar@ufl.edu

Course Materials Fee: \$140.00 per student to partially cover laboratory consumables.

Office hours: In addition to time at the end of the hands-on experiments, meetings can also be arranged by personal appointment via email to the instructors (include “HOS4313C” in the subject line) using the contact details above. Questions and discussions about course content are encouraged to be posted on the Canvas discussion forum. Please follow these guidelines for effective online interactions: <https://www.inc.com/business-insider/email-etiquette-rules.html>

Course Description

Molecular Biology studies how macromolecules encode and regulate the flow of genetic information in living organisms. This course will provide students with theoretical and practical experience in the basic laboratory methods for nucleic acid sequences and proteins. Instruction is based on a combination of lectures, dry and wet lab experimentation (through interactive class activities and/or internships), and maintenance of laboratory notebooks. In the first half of the course, students will learn about the state-of-the-art techniques for molecular cloning, common pitfalls, and how to manipulate DNA for plant molecular biology. In the second half of the course, students will be introduced to several approaches for the analysis of gene expression and proteins, including current bioinformatics resources that assist with data analysis. In addition, the class will learn about methods for transient and stable transformation in plants.

Course Goals

- Provide students with a thorough understanding of the physical-chemical and biological principles underlying basic techniques and procedures used in molecular biology.
- Foster the development of molecular techniques, planning, and organizational skills.
- Acquaint students with the exploration and utilization of bioinformatics resources.
- Help students develop critical thinking skills for lab book maintenance and data analysis.
- Develop and refine written and oral communication skills by describing and disseminating

molecular biology methods, experimental results and previously published information.

Learning Objectives. After taking this course, students will be able to:

- Recognize the basic types of techniques for the Central Dogma of biology.
- Prepare an electronic laboratory notebook to manage their methods and results.
- Design and test semi-automated protocols using liquid handling robots.
- Design primers (oligonucleotides) suitable for PCR and DNA assembly
- Select appropriate methods and supplies for DNA, RNA, and protein extraction.
- Plan experimental workflows for DNA, RNA, and protein quantification/evaluation.
- Apply various bioinformatic tools to interpret and process molecular information.
- Examine and compare methods available for the transformation of plants and microbes.
- Present and critically evaluate scientific figures, recognizing common pitfalls.

Reading Material: No textbook has been selected for this course. Electronic reading materials (including protocols, reviews, and primary research articles) will be provided to the students through Canvas (<https://elearning.ufl.edu/>). Helpful references include:

[Addgene: Molecular Biology Reference](#)

[Current Protocols in Molecular Biology - Wiley Online Library](#)

Class Schedule

Date	Class	Instructor	Topics
Tuesday, January 28, 2025	01	Voiniciuc	Introduction and Protocol Design
Thursday, January 30, 2025	02	Voiniciuc	Automating Biology with the OT-2
Tuesday, February 4, 2025	03	Voiniciuc	Assembling Your Molecular Toolkit
Thursday, February 6, 2025	04	Voiniciuc	DNA Quality and Normalization
Tuesday, February 11, 2025	05	Voiniciuc	Restriction Enzymes and Digestions
Thursday, February 13, 2025	06	Voiniciuc	DNA Analysis via Electrophoresis
Tuesday, February 18, 2025	07	Voiniciuc	Primer Design for PCR and Cloning
Thursday, February 20, 2025	08	Voiniciuc	DNA Amplification with PCR
Tuesday, February 25, 2025	09	Voiniciuc	DNA Assembly Methods
Thursday, February 27, 2025	10	Voiniciuc	E. coli Transformation and Selection
Tuesday, March 4, 2025	11	Voiniciuc	Verifying Colonies and DNA
Thursday, March 6, 2025	12	Voiniciuc	Multiple Sequence Alignment
Tuesday, March 11, 2025	13	Voiniciuc	Talks and Laboratory Reports
Thursday, March 13, 2025	14	Balmant	Introduction to Bioinformatics
Tuesday, March 18, 2025		Holidays	
Thursday, March 20, 2025		Holidays	

Tuesday, March 25, 2025	15	Balmant	Plant Transformation Methods
Thursday, March 27, 2025	16	Balmant	
Tuesday, April 1, 2025	17	Balmant	
Thursday, March 28, 2024	18	Balmant	Methods to Quantify Gene Expression
Tuesday, April 2, 2024	19	Balmant	
Thursday, April 4, 2024	20	Balmant	
Tuesday, April 9, 2024	21	Balmant	Methods to Analyze Proteins
Thursday, April 11, 2024	22	Balmant	
Tuesday, April 16, 2024	23	Balmant	
Thursday, April 18, 2024	24	Balmant	Seminar
Thursday, April 25, 2024		Reading Day	

Class Attendance

In-person attendance is critical for success in this class. Students are expected to arrive at the posted hours to ensure a timely start. The course coordinator will post course material on Canvas. Sharing of course materials is prohibited without the written consent of the instructors. Cell phones should be MUTED to minimize distractions. Since attendance of all classes is expected, contact the coordinator **prior to** the scheduled class if you are ill or an emergency occurs. The attendance requirements are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Lab Safety

Since the class will take place in a laboratory setting, all students must follow the [UF | EHS \(ufl.edu\)](#) and instructors' safety guidelines to ensure compliance. There include: eating or drinking in the lab, dressing appropriately (closed-toe shoes) and donning the proper personal protective equipment when conducting experiments.

[Chemical and Lab Safety » UF | EHS \(ufl.edu\)](#)

[Biological Safety » UF | EHS \(ufl.edu\)](#)

[Hazardous Waste Management » UF | EHS \(ufl.edu\)](#)

Individuals who do not comply with the safety rules will not be allowed in the lab. Students will be expected to keep their working area clean and uncluttered. Always ask questions if you are not completely sure about a procedure or piece of equipment. You are here to learn.

Student Evaluation

The class will combine lectures with several interactive activities, including the potential of a short-term internship to assist with a scientific project in a laboratory. Each student will maintain an electronic laboratory notebook ([Cloud-based platform for biotech R&D | Benchling](#)) and be evaluated on how well they document and organize the protocols, data and analyses.

The technical performance will assess the student preparedness for hands-on activities and their skills in following standard laboratory protocols. The Class/Lab participation will be based on a professional attitude and active participation during scientific lectures, discussions, and experiments. For the Mid-term and Final Exams, students will be tested on the principles of the techniques from prior class sessions, including the analysis of data resembling the class content. Expectations (including specific topics) and standards for all the activities will be detailed in class and will follow the UF [Grades and Grading Policies](#).

Evaluation Criteria	Points	% of Grade
1) Laboratory notebooks/activities	100	25%
2) Technical performance	40	10%
3) Class/Lab participation	60	15%
4) Mid-term Talks and Report	100	25%
5) Final Seminar and Report	100	25%
Total	400	100%

Instructions on the activities for each criterion will be provided during the class and on Canvas.

Letter grading scale based on %: 93-100 = A; 90-92 = A-; 87-89 = B+; 83-86 = B; 80-82 = B-; 77-79 = C+; 73-76 = C; 70-72 = C-; 67-69 = D+; 63-66 = D; 60-62 = D-; 59 and below = E.

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 via GatorEvals (<https://gatorevals.ua.ufl.edu/students/>) and will be allocated class time to complete this.

University's Honesty Policy

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."

- Student Honor Code: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>
- Guidelines for acceptable use of AI Tools: <https://go.ufl.edu/edis-ai-v1>

Health and Wellness 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, 352-392-1575, www.counseling.ufl.edu/cwc/
- Matter We Care, www.umatter.ufl.edu/
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/
- Student Success Initiative, <http://studentsuccess.ufl.edu>

Students with Disabilities

To request classroom accommodations, please consult the Disability Resource Center (0020 Reid Hall, 392-8565, www.disability.ufl.edu). Students requesting classroom accommodation should complete the required registration, obtain documentation, and provide this information to the Coordinator at the start of the course to arrange timely accommodations.