Syllabus

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

Location: Blueberry Building Teaching Lab (BLRB 152Links to an external site.); 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; 352-273-8103, balmant@ufl.edu

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

Gabriel Saraiva (Teaching Assistant) Fifield Hall; 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.htmlLinks to an external site.

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 the quantification and evaluation of DNA, RNA, and protein.
- Apply various bioinformatic tools to interpret and process molecular information.
- Examine and compare methods available for transformation of plants and microbes.
- Present and critically evaluate scientific data, 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/Links to an external site.). Helpful references include Addgene: Molecular Biology ReferenceLinks to an external site. and Current Protocols in Molecular Biology - Wiley Online LibraryLinks to an external site.

Class Schedule

Note: the first in-person meeting will be January 22, 2026. Information on the safety prerequisites to complete before this date will be shared via email and Canvas at the start of January.

Date	**Class**	**Instructor**	**Topics**
Thursday, January 22, 2026	01	Voiniciuc	Introduction and Protocol Design
Tuesday, January 27, 2026	02	Voiniciuc	Automating Biology with the OT-2
Thursday, January 29, 2026	03	Voiniciuc	Assembling Your Molecular Toolkit
Tuesday, February 3, 2026	04	Voiniciuc	DNA Quality and Normalization

Thursday, February 5, 2026	05	Voiniciuc	Restriction Enzymes and Digestions
Tuesday, February 10, 2026	06	Voiniciuc	DNA Analysis via Electrophoresis
Thursday, February 12, 2026	07	Voiniciuc	Primer Design for PCR and Cloning
Tuesday, February 17, 2026	08	Voiniciuc	DNA Amplification with PCR
Thursday, February 19, 2026	09	Voiniciuc	DNA Assembly Methods
Tuesday, February 24, 2026	10	Voiniciuc	E. coli Transformation and Selection
Thursday, February 26, 2026	11	Voiniciuc	Verifying Colonies and DNA
Tuesday, March 3, 2026	12	Voiniciuc	Multiple Sequence Alignment and **Group Videos**
Thursday, March 5, 2026	13	Voiniciuc	**Mid-term Talks**
Tuesday, March 10, 2026	14	Balmant	Introduction to Bioinformatics
Thursday, March 12, 2026	15	Balmant	Plant Transformation Methods
Tuesday, March 17, 2026		Holidays	
Thursday, March 19, 2026		Holidays	

Tuesday, March 24, 2026	16	Balmant	Plant Transformation Methods
Thursday, March 26, 2026	17	Balmant	
Tuesday, March 31, 2026	18	Balmant	Methods to Quantify Gene Expression
Thursday, April 2, 2026	19	Balmant	
Tuesday, April 7, 2026	20	Balmant	
Thursday, April 9, 2026	21	Balmant	Methods to Analyze Proteins
Tuesday, April 14, 2026	22	Balmant	
Thursday, April 16, 2026	23	Balmant	
Tuesday, April 21, 2026	24	Balmant	Seminar
Thursday, April 23, 2026		Reading Day	
Tuesday, April 28, 2026	25	Balmant & Voiniciuc	GatorEvals and Lab Olympics

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. Mobile device notifications should be silenced to minimize distractions. Since attendance of all classes is expected, contact the instructor **prior to** the scheduled class if you are ill or an emergency occurs. The attendance requirements are based on university policies that can be

found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspxLinks to an external site.

Lab Safety

Since the class will take place in a laboratory setting, students must follow the UF | EHS Links to an external site. and instructors' safety guidelines to ensure compliance, including: no eating or drinking in the lab, and dressing appropriately (closed-toe shoes). Students will have to wear personal protective equipment (provided by the instructors) when conducting experiments, and complete the following UF training webinars before starting the lab work:

- Chemical and Lab Safety » UF | EHS (ufl.edu)Links to an external site.
- Biological Safety » UF | EHS (ufl.edu)Links to an external site.
- Hazardous Waste Management » UF | EHS (ufl.edu)Links to an external site.

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 | BenchlingLinks to an external site.) and be evaluated on how well they document and organize the protocols, data and analyses. The technical performance will assess the student's preparedness for hands-on activities and their skills in following standard laboratory protocols. The Class/Lab participation will be based on 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.Links to an external site.

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

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-codeLinks to an external site.
- Guidelines for acceptable use of AI Tools: https://go.ufl.edu/edis-ai-v1Links to an external site.

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 who have personal problems or lack clear career or academic goals, which interfere with their academic performance.

- University Counseling & Wellness Center, 352-392-1575, counseling.ufl.edu/cwc/Links to an external site.
- Matter We Care, umatter.ufl.edu/Links to an external site.
- Career Resource Center, First Floor JWRU, 392-1601, crc.ufl.edu/Links to an external site.
- Student Success Initiative, http://studentsuccess.ufl.eduLinks to an external site.

Students with Disabilities

To request classroom accommodations, please consult the *Disability Resource Center* (0020 Reid Hall, 392-8565, www.disability.ufl.eduLinks to an external site.). 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.

UF Faculty Evaluations (GatorEvals)

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.comLinks to an external site.

Guidance on how to provide constructive feedback is available at https://gatorevals.aa.ufl.edu/students/Links to an external site.. 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/Links to an external site..