



# MOLECULAR TECHNIQUES IN ANIMAL GENETICS

ANS 4389L/6379L

**\*\*2 CREDITS\*\***

## **DESCRIPTION**

Genomic technologies are rapidly moving from the lab bench to the marketplace. Animal agriculture is no exception to this trend. A variety of genetic tests are commercially available for traits as diverse as coat color, meat quality and racing performance in species from small ruminants to horses. Using cattle and horse examples we will investigate the methods used in a number of genotyping approaches. Laboratory work will take genomics out of the “black-box”; providing an opportunity to learn genotyping and DNA analysis techniques in a hands-on environment.

### ***Instructors:***

Dr. Samantha Brooks

Dr. Raluca Mateescu

### ***Location:***

201 Dairy

### ***Time:***

10:40am- 12:35pm T,R

### ***Prerequisites:***

ANS3384 or equivalent

### ***Office Hours:***

11:30am- 12:30am Fridays OR

By Appointment

Credits: 2; Prerequisites: ANS 3384 or equivalent

Studies the principles of basic animal molecular biology techniques and provides hands-on experience through laboratory exercises.

### Objectives

Students will gain knowledge in:

1. Developing good working habits and analytical skills in a laboratory setting.
2. Practice of standard genomics techniques in genotyping and DNA analysis.
3. Organization and dissemination of their own research findings.
4. Developing skills to interpret scientific data.
5. Developing oral communication skills for formal presentations and informal scientific discourse.

### Textbook

No formal textbook is required. Students will be provided readings on Canvas that are current and relevant to topics discussed in class. For reference and further reading students might be interested in one of the following books from the library:

- Mulhardt, C. *Molecular Biology and Genomics (The Experimenter Series)*, 4<sup>th</sup> Ed, 2007, Academic Press.
- Brown, T.A. 2000. *Essential Molecular Biology: Practical Approach*. 2<sup>nd</sup> Edition. Oxford University Press.
- Sambrook, J. and Russell, D.W. 2001. *Molecular Cloning: A Laboratory Manual*. 3<sup>rd</sup> Edition. Cold Spring Harbor Laboratory Press, NY.

Additional materials (handouts and video clips) on each major topic are also released on Canvas. To enable productive use of lab time these readings should be completed, and all protocols reviewed, prior to class. Quizzes on topics from the readings will be conducted before each class on canvas.

### Communication

Course materials and messages will be hosted on our Canvas e-Learning site. Assignments and assessments will only be accepted through Canvas. Email can be sent either through the Canvas system, or the standard @ufl.edu system. Please be sure you change your canvas settings so that you receive course announcements daily, not once a week, so that you get messages on time! Keep in mind that while email is fast and simple, you should always use a courteous and professional attitude when communicating with your instructors and fellow students. Please be polite to your instructors and fellow students and limit use of slang and abbreviations.

### Fees

In lab opportunities are a great learning experience, but do require reagents and consumables. We have carefully budgeted supplies for the semester so that we have what we need for the planned experiments, but keep costs as low as possible for our students. Please keep this in mind and avoid unnecessary waste of items like gloves, tubes and reagents as you would through this course.

**Credit and assessments****40%- Quizzes**

The quizzes will be taken online using the canvas system and are due 1 hour before class commences each day. They will consist of short questions from the readings and protocols assigned for the upcoming lab period. You will have a limited time to take it once you start the quiz (10 minutes) – so it is important that you study before you start taking the quiz. Please make sure you have a secure internet connection (if you lose the internet connection your quiz will end and you will not be allowed to take it again).

**40%- Lab Notebooks and Datasets**

Although students might be working in groups on experiments, each student is required to maintain a bound lab notebook with numbered pages. The lab notebook should contain a descriptive title, date, purpose, protocols, results, discussion, and other details necessary to repeat your work. The lab notebook will be checked once a week throughout the semester.

**20%- Final Presentations**

Each student will be required to prepare a presentation at the end of class describing a potential application of the protocols performed in lab to an topic from animal industry that interests them. Scores will be based on instructor's assessments of the presentation, as well as peer-reviews following a well-defined rubric.

Due dates for all assignments are presented in the course schedule.

**Grading Scale**

<b>93-100%- A</b>	<b>80-82.9%- B-</b>	<b>67-69.9%- D+</b>
<b>90- 92.9%- A-</b>	<b>77-79.9%- C+</b>	<b>63-66.9%- D</b>
<b>87-89.9%- B+</b>	<b>73-76.9%- C</b>	<b>60-62.9%- D-</b>
<b>83-86.9%- B</b>	<b>70-72.9%- C-</b>	<b>60% and Below- E</b>

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Dress Code**

This is a wet-lab course. Students are required to dress appropriately, including shoes that cover the top of your foot, shirts that cover all of the torso (no tank or tube tops) and long pants. Long hair should be tied back, to protect both you and your experiments.

Furthermore, as representatives of this class, our department and our university you are expected to dress, and to act, in a professional manner at all times.

**Cell Phone, Laptops and Other Technology**

Cell phones must remain silenced and stored during class and labs unless specifically permitted for an activity or assignment.

Use of laptops, tablets, and internet connected devices is encouraged during specific sessions in this course. However, these devices do come with social responsibility. Students are expected to keep sounds turned off, not to distract those around them, and most of all to limit “multitasking” activities that will distract themselves (ie email and social media.) Excessive multitasking and disruptive use of electronic devices will result in a dismissal from the classroom.

### Attendance and Make-Up Work

This course requires active participation, hands-on lab work and discussion with your peers. As such attendance is imperative.

University policies 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>.

It is your personal responsibility to obtain information presented in class. Documentation of approved absences (personal illness, family emergency etc.) must be presented within 5 days for arrangements to be made to make-up quizzes and assignments. University approved absences for sports and student organizations must be disclosed at least two weeks in advance. **Late assignments due to unexcused absence will be penalized 25% for the first 24 hours beyond the due date, 50% for 24-48hrs late and will not be accepted thereafter.**

### 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 Plagiarism:

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.

### **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/](http://www.dso.ufl.edu/drc/)

### **Campus Helping 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, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu/cwc/](http://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/](http://www.umatter.ufl.edu/)*
- *Career Resource Center, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)*

**Course Schedule (subject to modification to accommodate travel and guest speakers)**

<b>WEEK</b>	<b>DATE</b>	<b>Lab Topic</b>	<b>Due</b>
1	1/8	Lab Safety, Lab Notebooks	---
	1/10	Pipetting Practice	Quiz
3	1/15	Bioinformatics- ONLINE ASSIGNMENT!!	Quiz
	1/17	Bioinformatics/ sequence analysis con't	---
4	1/22	Serial Dilutions	Quiz
	1/24	DNA Extraction from Hair	Quiz
5	1/29	DNA extraction from Blood	Quiz, Notebooks
	1/31	DNA extraction from Blood con't	Quiz
6	2/5	DNA Quantification	Quiz
	2/7	PCR Basics	Quiz
7	2/12	PCR Continued	Quiz, Notebooks
	2/14	Gel Electrophoresis	Quiz
8	2/19	Restriction Endonucleases	Quiz
	2/21	PCR Primer Design	Quiz
9	2/26	PCR Primer Optimization	Quiz, Notebooks
	2/28	T-ARMS-PCR	Quiz
---	3/5-7	SPRING BREAK	---
10	3/12	Electrophoresis of Small Products	Quiz
	3/14	High GC PCR	Quiz, Presentations Topics
11	3/19	PCR prep for Sequencing	Quiz
	3/21	Field trip to the UF Sequencing Core	Quiz
12	3/26	DNA sequencing	Quiz
	3/28	Catch-up day	Quiz, Notebooks
13	4/2	High Resolution Melt	Quiz
	4/4	RNA extraction	Quiz
14	4/9	RT-PCR	Quiz
	4/11	qPCR	Quiz, Notebooks
15	4/16	qPCR Analysis	Quiz
	4/18	Presentations Day 1	Peer-Reviews
16	4/23	Presentations Day 2	Peer-Reviews