



# 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. Here is a helpful guide on good email etiquette: <https://writingcommons.org/article/e-mail-guidelines-for-students/>

## Student Behavioral Expectations

The university released today a policy on student behavioral expectations in response to covid-19. <https://policy.ufl.edu/policy/student-behavioral-expectations-in-response-to-covid-19/>

Additionally, we have posted guidelines and expectations for navigating the Zoom classroom and on Canvas.

## 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

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

## 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/>.

## 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 labs and discussion with your peers. As such attendance is imperative, even if this attendance is in a virtual space.

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 feel ill, have a fever or experience any other symptoms of infectious disease please do not attend an in-person class session. However, as always, it is ***your personal responsibility*** to notify the instructor of the necessity of your absence and then to complete the make-up work as soon as it is possible for you to do so. Documentation of other approved but unexpected absences (family emergency etc.) must be presented ***within five days*** of the absence in order to receive make-up quizzes and assignments. University approved absences for sports and student organizations travel or activities must be disclosed at least ***two weeks*** in advance.

*Late assignments without an excuse will be penalized 25% for the first 24 hours beyond the due date, 50% for 24-48hrs late and will not be accepted thereafter.*

### **COVID-19 Policy**

In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

***•If you are not vaccinated, get vaccinated.*** Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus. Visit this link for details on where to get your shot, including options that do not require an appointment:

<https://coronavirus.uflhealth.org/vaccinations/vaccine-availability/>.

Students who receive the first dose of the vaccine somewhere off-campus and/or outside of Gainesville can still receive their second dose on campus.

- ***You are expected to wear approved face coverings at all times*** during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.
  - Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
  - Hand sanitizing stations will be located in every classroom.
- If you sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect

offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.

•Continue to regularly visit [coronavirus.UFHealth.org](https://coronavirus.UFHealth.org) and [coronavirus.ufl.edu](https://coronavirus.ufl.edu) for up-to-date information about COVID-19 and vaccination.

### **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 educational 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 delivered by any 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 presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or 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 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 professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>.

Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>.

Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-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>.

***To help you navigate finding good quality references, citing sources appropriately and avoiding plagiarism we have partnered with your library to create a resource page specifically for this class:***

<http://guides.uflib.ufl.edu/equinehealth>.

## **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, <https://disability.ufl.edu/>

## 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.

- *U Matter, We Care*: If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit U Matter, We Care website 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 or call 352-392-1575 for information on crisis services as well as non-crisis 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.
- *University Police Department*: Visit UF Police Department website or call 352-392-1111 (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.
- *GatorWell Health Promotion Services*: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

## Academic Resources

- *E-learning technical support*: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).
- *Career Connections Center*: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- *Library Support*: Various ways to receive assistance with respect to using the libraries or finding resources.
- *Teaching Center*: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring.
- *Writing Studio*: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- *Student Complaints On-Campus*: Visit the Student Honor Code and Student Conduct Code webpage for more information.
- *On-Line Students Complaints*: View the Distance Learning Student Complaint Process.

**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	1/6	Lab Safety, Lab Notebooks- ONLINE ASSIGNMENT!!	---
2	1/11	Bioinformatics- ONLINE ASSIGNMENT!!	Quiz
	1/13	Bioinformatics/ sequence analysis con't	Quiz
3	1/18	Pipetting Practice	---
	1/20	Serial Dilutions	Quiz
4	1/25	DNA Extraction from Hair	Quiz
	1/27	DNA extraction from Blood	Notebooks
5	2/1	DNA extraction from Blood con't	---
	2/3	DNA Quantification	Quiz
6	2/8	PCR Basics	Quiz
	2/10	PCR Continued	Notebooks
7	2/15	Gel Electrophoresis	Quiz
	2/17	Restriction Endonucleases	---
8	2/22	PCR Primer Design	Quiz
	2/24	PCR Primer Optimization	Notebooks
9-10	3/1	T-ARMS-PCR	Quiz
	3/3	Electrophoresis of Small Products	---
	3/8-10	SPRING BREAK	---
11	3/15	High GC PCR	Quiz, Presentations Topics
	3/17	PCR prep for Sequencing	---
12	3/22	Field trip to the UF Sequencing Core	Quiz
	3/24	DNA sequencing	---
13	3/29	High Resolution Melt	Quiz, Notebooks
	3/31	RNA extraction	Quiz
14	4/5	RT-PCR	Quiz
	4/7	qPCR	Quiz
15	4/12	qPCR Analysis	Quiz, Notebooks
	4/14	Presentations Day 1	Quiz
16	4/19	Presentations Day 2	Peer-Reviews