

## ADVANCED METHODOLOGY IN EXERCISE BIOLOGY

PET5936 ~ 3 CREDIT HOURS ~ FALL 2020

**INSTRUCTOR:**

Lead Instructor: Terence Ryan, Ph.D.  
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**OFFICE HOURS:**

office hours by appointment, or as announced in class

**MEETING TIME/LOCATION:** FLG 250, Mondays period 6-8 (12:50 – 3:50p)

**COURSE DESCRIPTION:** This is a special topics course that provides lab-based experiential learning using state-of-the-art methodologies in molecular and exercise biology.

**PREREQUISITE KNOWLEDGE AND SKILLS:** Previous course work in biology, chemistry, and biochemistry is helpful.

**REQUIRED AND RECOMMENDED MATERIALS:** No textbook is required for this course. Specific course materials including published literature of relevance will be shared via CANVAS.

**COURSE FORMAT:** This course is designed primarily as a hands-on lab based course designed to help students develop basic research skills in molecular biology. During scheduled meeting times, most class sessions will include performing actual

experiments and data collection in a laboratory setting. There will be occasional sessions where discussion of methodologies and data analysis approaches will be covered in a classroom setting.

**COURSE LEARNING OBJECTIVES:** Learning objectives for this course are listed below:

*Molecular Cloning*

- 1) Demonstrate technical proficiency in plasmid design including design of primers, proper control procedures, and validation of end product
- 2) Perform molecular cloning to introduce RNA interference to cultured cells
- 3) Purify and verify plasmids from bacterial cultures
- 4) Demonstrate understanding of the basic principles of molecular cloning in biomedical research
- 5) Identify technologies available for plasmid delivery of cultured cells and organisms, including the benefits and limitations of approaches

*RNA Analysis*

- 1) Demonstrate technical proficiency in design including design of primers for real-time PCR analyses
- 2) Identify the requisite controls required to ensure your RT-PCR analyses are accurate and appropriate
- 3) Perform RNA isolations from cells and measure quality and quantity of the product
- 4) Demonstrate proficiency in gene expression analyses from cells and tissues

*Protein Analysis*

- 1) Perform western blotting analysis for protein abundance in biological samples
- 2) Derive proper controls necessary to validate antibodies for use in experiments
- 3) Analyze protein abundance data from western blotting experiments in biological samples

*Cell Culture*

- 1) Operate laboratory procedures using sterile aseptic technique which are necessary for basic cell culture applications
- 2) Maintenance and quality control testing of cell lines
- 3) Utilization of cell lines for testing basic biological mechanisms

*AAV packaging, purification, and utilization*

- 1) Attain an understanding of AAV utilization in biomedical research
- 2) Perform AAV packaging, purification, and titrating for use in cells and animals
- 3) Characterize the expression of AAVs and gene of interest expressed

*Immunofluorescence and Histological Analysis of Muscle*

- 1) Perform tissue histological analyses

- 2) Cryosection tissues and mount to microscope slides to produce high quality images
- 3) Achieve proficiency on the proper freezing and preparation of tissues for histological analysis, including the use of fixatives

#### *Mitochondrial Function*

- 1) Understand the basic principles of bioenergetics
- 2) Perform mitochondrial function analyses including polarographic oxygen consumption and reactive oxygen species production
- 3) Analyze mitochondrial function data from muscle cells and isolated organelles

#### *Basics of Proteomics Analysis*

- 1) Prepare protein lysates for TMT-labeled proteomics analysis
- 2) Organize and produce analyses of proteomics results obtained from core facility
- 3) Discuss basic concepts of proteomics analysis and sample preparation that impact experimental outcomes

## COURSE AND UNIVERSITY POLICIES:

**ATTENDANCE POLICY:** It is expected in graduate level courses that students will always be in attendance. However, because of outside activities expected of graduate students, illness, etc. there are often unexpected absences. It is expected that if you cannot attend class for any reason you will contact the lead instructor regarding your reasons for absence. Weekly participation is a large part of the final grade in this course, so attendance is considered a high priority. Students missing class without excuse will receive a proportional reduction in their grade for this component of the course.

**PERSONAL CONDUCT POLICY:** Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Outline for them exactly what that means in the context of your course. 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 Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions.

Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult the instructor, Dr. Ryan, in this class.

**EXAM MAKE-UP POLICY:** There will be one take home exam for this course at the end of the semester. Students who cannot complete the exam in the assigned timeframe should let the instructor know in advance and an agreed upon make-up will be negotiated between the student and instructor.

“Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.”

**ACCOMMODATING STUDENTS WITH DISABILITIES:** Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting their Get Started page at <https://disability.ufl.edu/students/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.

**COURSE EVALUATIONS:** 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/>.

**COVID-RELATED:** For face to face courses a statement informing students of COVID related practices such as:

- We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.
- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.

- 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.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms ([Click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#).
- 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. [Find more information in the university attendance policies](#).

**PRIVACY:** For online course with recorded materials a statement informing students of privacy related issues such as:

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

## GETTING HELP:

### Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575
- Counseling and Wellness Center: <https://counseling.ufl.edu/>, 352-392-1575
- Sexual Assault Recovery Services (SARS) - Student Health Care Center, 392-1161
- University Police Department, 392-1111 (or 9-1-1 for emergencies)  
<http://www.police.ufl.edu/>

### Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu). <https://lss.at.ufl.edu/help.shtml>
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. <https://career.ufl.edu/>

- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <http://writing.ufl.edu/writing-studio/>
- Student Complaints On-Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/> On-Line Students Complaints: <http://distance.ufl.edu/student-complaint-process/>

## GRADING:

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Weekly Participation (14)	10 pts each = 140 pts	140/340 = 41.2%
Weekly Data Analysis and Presentation	100 pts	100/340 = 29.4%
Final Lab Exam (1)	100 pts	100/340 = 29.4%

**Class Participation** – We will be actively performing data collection to learn modern methods in molecular and exercise biology. Weekly participation in data collection are a considerable portion of the course grade. It is expected that students will be able to demonstrate proficiency in the techniques learned and used throughout the course. This proficiency will be directly assessed by the instructor by reviewing data collection, lab notebooks, and analytic technique throughout the course.

**Weekly Data Analysis and Presentation** – This course is designed for the majority of in-class scheduled time to be used for hands-on laboratory learning. Throughout the semester, students will be asked to perform data analysis, statistical calculations, and graphing of data on a weekly basis. Additional homework will be needed for preparing future experimental calculations outside of the class meeting times.

**Final Lab Exam** – Final examination in this course will involve two assignments. First, we will have a practical examination that involves written descriptions of experimental procedures and demonstrating proper use of laboratory calculations. The second assignment is related to providing publication quality methods, results, analysis, and graphing of data collected throughout the course as well as copies of each individuals detailed laboratory notebook. It is planned that these written details and data will be compiled into a manuscript for publication in which all students will be co-authors.

**GRADING SCALE:** We will utilize a modified overall grading scale for the final grade of the class:

90-100% = A  
80-89.99% = B  
70-79.99% = C  
60-69.99% = D  
<60 = E

“More detailed information regarding current UF grading policies can be found here:  
<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.”

## SUCCESS AND STUDY TIPS:

The instructors encourage you to learn to UNDERSTAND the underlying principles by listening, reviewing the course materials and readings, and asking questions. Take time to break down experimental procedures into small steps that lead towards the end result. Memorizing methodology is not necessary for success, but a thorough and broad understanding of biological experimental design is crucial for success in science.

We hope to make the class exciting and accessible and will appreciate getting feedback as we go.