Department of Applied Physiology and Kinesiology
College of Health and Human Performance
UNIVERSITY of FLORIDA

CURRENT TOPICS IN SCIENCE: IMAGING AND MICROSCOPY

PET5936 | Class # 26617 (0207) | 3 Credits | Fall 2025

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Course Info

INSTRUCTOR

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Preferred Method of Contact: Email through Canvas

OFFICE HOURS

2 hours/week, Details will be provided on CANVAS

MEETING TIME/LOCATION

Lectures: FLG 225; Hands-on: Labs, R Period 6-8 (12:50 – 3:50 PM)

COURSE DESCRIPTION

The course will provide principles and applications of microscopy, focusing on techniques that are used for skeletal muscle research. Major topics include basics of widefield and confocal microscopy, brightfield and fluorescent stains and probes, and their applications. Hands on demonstrations will be integrated into lectures.

PREREQUISITE KNOWLEDGE AND SKILLS

Graduate course in physiology required.

REQUIRED AND RECOMMENDED MATERIALS

Purchase of a textbook is not required. Suggested reading and copies of the lecture slides will be posted on the course website (Canvas) prior to each lecture. Materials for Hands on Demonstration will be provided.

COURSE FORMAT

This course will incorporate a problem-based learning method that will emphasize the importance of both critical thinking and a thorough understanding of the course materials. The class will meet 3 hours each week for lectures and hands-on demonstrations. Lecture time will be generally divided among the following activities:

1) Didactic presentations to provide background on the weekly topic;
2) Student group discussion of possible applications of approaches;
3) Discussion of student-initiated questions on applications of microscopy.

Questions are encouraged at any time during the lectures. *Students will be expected to be active participants throughout class discussions*.

Hands-on Demonstration time will be divided into:
1) Hands-on staining of cells/tissues section slides for imaging purposes
2) Basic operation of light microscopes
3) Discussion on the staining and imaging processes, and application of the approaches.

COURSE LEARNING OBJECTIVES:

Following the completion of this course, students will have met the course goals if they can:

- **Explain** the principles of light microscopy.
- **Name** and **describe** features of fluorescent probes and dyes used for microscopy.
- **Explain** the technical aspects of fluorescent and confocal microscopy
- **Describe** common staining methods used in skeletal muscle research and **compare** and **contrast** when these methods are best used.

Course & University Policies

Please refer to the following link for UF Academic policies, as well as Academic and Health and Wellness Resources. Below you will more detailed information related to this course.

ATTENDANCE

Attendance is encouraged for all class time sessions. It will be part of the Class Participation grade (see below). You will be excused from class if you have a legitimate reason to be gone; please send an email before class starts as to why you need to miss the class. These will be kept on file for the semester. Please note: the University has specific reasons that are acceptable for missing class, which apply to both undergrad and grad students. You can find this here :

"In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved."

PERSONAL CONDUCT & ACADEMIC INTEGRITY

Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Students are expected to join the lecture on time, but tardiness is acceptable when personal conflicts require the student to enter the lecture later than the scheduled time. Students are expected to be quiet and cause minimal disturbance to the class if entering the lecture hall late.

Laptop computers and tablet devices for note taking are allowed to use during the course. We may also use on line resources during lectures. Upon entry into the lecture, please silence your cell phone and do not answer the phone or respond to a text message during class.

APPROPRIATE USE OF AI TECHNOLOGY

The UF Honor Code strictly prohibits *cheating.* The use of any materials or resources prepared by another person or Entity (inclusive of generative AI tools) without the other person or Entity's express consent or without proper attribution to the other person or Entity is considered *cheating*. Additionally, the use of any materials or resources, through any medium, which the Faculty / Instructor has not given express permission to use and that may confer an academic benefit to a student, constitutes *cheating*.

The use of AI enabled tools (e.g., AI-assisted Grammarly and ChatGPT) in course assignments is allowed, but the tool and how it was used must be stated clearly on the top lines of the assignment. Instructors will confirm that students understand the assigned concepts through face-to-face questions and in the in-class presentations, particularly when AI enabled tools have been utilized. Failure to demonstrate comprehension of the material will result in a failing grade for the assignment.

IN-CLASS RECORDING

Students are allowed to record 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.

This year, faculty will have the opportunity to record lectures using Plaud, an AI voice recorder, to enable a transcription of the lecture, and a summary of key points. These notes will be provided to all students in the class, and it will be anonymized regarding in class discussions. These transcripts will be the property of the presenter.

ASSIGNMENT MAKE-UP POLICY

Assessments are project based with weekly short assignments in class. Projects are expected to be submitted on time. Late assignments will be penalized 10% for each day that it is late, unless permission was granted prior to the deadline. If you miss a weekly assignment because of an excused absence, an extension will be granted to enable submission the following week. If an assignment is missed due to an unexcused absence, it will not be rescheduled, and you will receive a "0" for that assignment. "

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. 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 here. 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 here .

APK ADMINISTRATORS

For suggestions or concerns related to APK courses or programming, please reach out to any of the following:

- Dr. David Vaillancourt (he/him), APK Department Chair, vcourt@ufl.edu
- Dr. Demetra Christou (she/her), APK Department Vice Chair, ddchristou@hhp.ufl.edu
- Dr. Steve Coombes (he/him), APK Graduate Coordinator, scoombes@ufl.edu

Grading

Grades will be assigned based on points earned in the course as follows:

Evaluation Components (Number of each)	Points Per Component	Approximate % of Total Grade
Projects (3)	25 pts each = 75 pts	75%
Weekly assignments (10)	2 pts each = 10 pts	10%
Class Participation (15)	15 pts each = 15 pts	15%

Projects: There will be three projects, one for each section, which will be based on the approaches learned in the section. These projects will be worth 25 points each, and overall, will comprise 75% of the grade. Due dates for handing in project papers are listed on the course schedule page.

Assignments: There will be one assignment for each week for Weeks 2-4; 6-9; and 11-13 of this course, 10 assignments in total. The assignment(s) will be a summary on the material for the week, highlighting the most interesting fact you learned. Each assignment is worth 1 point.

Class Participation: All students are expected to actively participate in both the discussion during lectures and activities during hands-on demonstration sessions. A portion of these points will be given just for showing up to class, and those who are more vocal/active in class will receive full credit. A detailed grading rubric for this assessment will be posted in CANVAS.

GRADING SCALE

Grades will be posted on the canvas course website typically within 48-96 hours after the deadline. Final grades in the class will be determined by the total points earned during the semester. Grades will be calculated to the nearest 2 decimal places. Any requests for additional extra credit or special exceptions to these grading policies will be respectfully ignored.

Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	90.00-100%	4.0
B+	87.00-89.99%	3.33
B	80.00-86.99%	3.0
C+	77.00-79.99%	2.33
C	70.00-76.99%	2.0
D+	67.00-69.99%	1.33
D	60.00-66.99%	1.0
F	0-59.99%	0

SUCCESS AND STUDY TIPS

To ensure success of this course, all students are encouraged to read the course materials provided on CANVAS before class, attend the lectures, ask questions during and after class, and engage in discussions/activities during class. Contact the instructor when having doubt on the materials and topics for each week. Strive to constantly apply the approaches learnt in the course to own research activities, challenging the methods if needed.

Tentative Weekly Course Schedule

Week	Dates	Topics	Instructor	Location
Part 1 Fundamentals in microscopy				
1	Aug 21	Course introduction / Overview	Barton/Wei-LaPierre	FLG225
2	Aug 28	Physics of microscopy/Widefield/Light microscopy	Barton	FLG225
3	Sep 4	Histological staining for muscle gross structure/fat infiltration/fibrosis/calcification (HE/Picrosirius red/Trichrome/Oil red-O/Alizarin Red)	Barton	FLG225
4	Sep 11	Hands-on Demo for staining and brightfield imaging	Barton/Wei-LaPierre	FLG36/37
5	Sep 18	Project 1: Staining application for muscle pathology		
Part 2 Fluorescent microscopy				
6	Sep 25	Principles of fluorescent microscopy/Physics of fluorophores/Fluorescent microscope	Wei-LaPierre	FLG225
7	Oct 2	Fluorescent probes/indicators: Calcium/pH/ROS/Fat/membrane potential /FRET-based/cell surface labelling /organelle interactions. Dyes vs. genetically engineered probes.	Wei-LaPierre	FLG225
8	Oct 9	Applications of fluorescent microscopy: Biomolecular Fluorescence Complementation (BiFC) Förster Resonance Energy Transfer (FRET) Fluorescence Recovery After Photobleaching (FRAP) Proximity labelling; cell surface labelling.	Barton	FLG225
9	Oct 16	Hands-on Demo for muscle fiber-type staining and fluorescence microscopy	Barton/Wei-LaPierre	FLG37
10	Oct 23	Project 2: Fluorescent probe application for target process or protein		
Part 3 Laser scanning microscopy				
11	Oct 30	Principles and physics of Laser Scanning Confocal Microscopy Overview of Super-resolution Microscopy/Multi-photon microscopy Hands-on: Confocal Microscope Familiarization	Wei-LaPierre	FLG225/44
12	Nov 6	Optimization of Laser Scanning Confocal Microscopy Hands-on demo of confocal imaging: Mitochondrial Calcium; mitochondrial flashes in muscle cells (BODYPY or di-8-ANNEPS if possible)	Wei-LaPierre/Barton	FLG225/44
13	Nov 13	Imaging of neuromuscular junctions (potential hands-on demonstration) Approaches in neuroimaging	Guest speakers: Matt Lee Yi Zuo (UC Santa Cruz)	FLG225 Zoom
14	Nov 20	Imaging of hair cells in inner ears. (spinning disk confocal microscopy, TIRF, with lab demonstration)	Guest speaker: Jonathan Bird	ARB (TBD)
Finals week	Dec 11 /TBD	Project 3: Image modality application for muscle or cellular process		