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

Cell Physiology & Biophysics

APK6195 | Class # 23864 | 3 Credits | Spring 2026

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Course Info

INSTRUCTOR

Terence E. Ryan, Ph.D.
Office: FLG 114
Office Phone: 294-1700
Email: ryant@ufl.edu
Preferred Method of Contact: **email**

OFFICE HOURS

Office hours will be posted on the Canvas page

MEETING TIME/LOCATION

FLG 225 - Monday periods 5-7 (11:45P – 2:45P)

COURSE DESCRIPTION

The overall goal of this class is the provide a solid understanding of the molecular basis that controls cellular physiology. Emphasis is placed on understanding the basic tenants of genome structure/function and gene expression, protein synthesis and gradation, cell cycle/division and death, cytoskeleton, and cellular metabolism. Attention is placed on understanding the cellular physiology responses to exercise.

PREREQUISITE KNOWLEDGE AND SKILLS

BSC2010 or equivalent undergraduate biology course or by permission of the instructor.

REQUIRED AND RECOMMENDED MATERIALS

Textbook: Alberts et al. ESSENTIAL CELL BIOLOGY ISBN: 978-1-324-03348-6; 6th Edition: Publisher: W. W. NORTON & COMPANY ©2023 (hardbound, digital, or paperback available)

Access to computer and CANVAS.

COURSE FORMAT

Course material is largely presented as live lecture. Occasionally, lectures may be substituted to a pre-recorded format, when needed for scheduling. Students will have copies of the lecture material on Canvas to work from. Students will also be expected to learn from regular reading assignments in the Alberts et al. textbook or may be given additional reading in online-accessible manuscripts or reviews. In general, class time each week will include 2 periods of lecture and one period of reinforcement, active learning or specialized learning activities.

COURSE LEARNING GOALS: By the end of this course, students should be able to:

- Define, describe, and illustrate the basic chemical building blocks of the eukaryotic cell, including how cells communicate with other cells and their environment.
- Explain the integrative control of gene expression including genome structure, DNA transcription and repair, mRNA processing and splicing, and epigenetic regulation.
- Describe the basic mechanisms by which RNA is converted into proteins via its interaction with ribosomal machinery.
- Explain the basic processes that a cell can use for protein turnover/degradation.
- Evaluate the methods used by scientists to manipulate the genetic code in living animals and cells by techniques such as RNA interference, transgene expression, CRISPR, CRE-LOX, and other genetic models used in biomedical research.
- Analyze the basic elements of the cytoskeleton that are part of every cell, including microfilaments, microtubules and spectrin, and how these cytoskeletal elements impact cellular physiology.
- Analyze the most common generalized cell signaling pathways that are utilized in many ways to regulate cell function, including G-protein-liked responses, enzyme linked receptor systems, catalytic dimerization, MAPK signaling, stress activated signaling, etc.
- Defend and critique course material or ideas related to cellular physiology and evaluate methods employed by researchers in cellular physiology.
- Evaluate the complex linkage between mitochondrial function, redox biology, and antioxidant systems and how these systems change across the range of normal and pathological physiology.

Course & 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. There is a 30% class participation grade. 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.

University of Florida students are bound by the Honor Pledge. On all work submitted for credit by a student, the following pledge is required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Student Honor Code and Conduct Code (Regulation 4.040) specifies a number of behaviors that are in violation of this code, as well as the process for reported allegations and sanctions that may be implemented. All potential violations of the code will be reported to Student Conduct and Conflict Resolution. If a student is found responsible for an Honor Code violation in this course, the instructor will enter a Grade Adjustment sanction which may be up to or including failure of the course.

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*.

EXAM MAKE-UP POLICY

For all planned absences, a student in a situation that allows an excused absence from a class, or any required class activity must inform the instructor as early as possible prior to the class. For all unplanned absences because of accidents or emergency situations, students should contact their instructor as soon as conditions permit.

A student experiencing an illness should visit the UF Student Health Care Center or their preferred healthcare provider to seek medical advice and obtain documentation. If you have an illness, family emergency or death, please provide any documentation to the instructor regarding illness or family emergency.

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/.

Getting Help

HEALTH & WELLNESS

- ***U Matter, We Care**:* If you or someone you know is in distress, please contact 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; or 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.
- ***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 & Grievances***: Students are encouraged to communicate first with the involved person(s), but here is more information on the appropriate reporting process.

APK ADMINISTRATORS

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

- Dr. David Vaillancourt, APK Department Chair, vcourt@ufl.edu
- Dr. Demetra Christou, APK Department Vice Chair, ddchristou@hhp.ufl.edu
- Dr. Steve Coombes, APK Graduate Coordinator, scoombes@ufl.edu
- Dr. Anna Gardner, APK Undergraduate Coordinator, akgardner@ufl.edu

Civility, Accessibility, and Community Resources

This is a science-based course, which should ideally be objective in its presentation, interpretation, and valid for everyone. However, much of science is subjective and is historically built on a small subset of privileged voices. I acknowledge that the readings for this course were authored by white men and women. Furthermore, the course relies heavily on findings from experiments mostly conducted by white men. The interpretation and presentation are modified, as feasible, by the instructor. I will make an effort to acknowledge whenever possible the contribution that people from several races, sexes, and backgrounds have given to the field. However, I admit that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Please contact me (in person or electronically) or submit anonymous feedback if you have any suggestions to improve the quality of the course materials.

Furthermore, I would like to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official UF records, let me know as indicated above.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you. Remember that you can also submit anonymous feedback (which will lead to me making a general announcement to the class, if necessary to address your concerns).
- If you prefer to speak with someone outside of the course, see the list of contacts below.
- I am continuing to learn about diverse perspectives and identities, and still adapting to the cultural differences between countries and regions. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it. Again, anonymous feedback is always an option.

Grading

Evaluation Components	Points Per Component	Approximate % of Total Grade
Lecture and Course material Exams (2)	30 points ea	60%
Oral Examination	30 points	10%
Class Participation	30 points ~2 pts per week)	30%

Lecture and learning material Exams – Exams will be designed to fit within a single class period and will consist of between 25-35 questions, including varying amounts of either standard multiple choice-type questions and particularly essay questions. Undergraduates taking the class are likely to receive different exams. Student are expected to be responsible for both the lecture material and he assigned reading material. An emphasis will be placed on thinking and understanding and less on memorization. The final will not be comprehensive but will cover all material presented since the last exam.

Oral Examination – The oral exam will be taken with all students at the same time and will last ~3 hours. Each student will have to answer 1-2 questions per oral exam with minimal assistance from classmates. Answers the questions will involve drawing physiological processes on the board with an accompanied explanation of the answer. Questions from the oral exam can come from all topics covered in the course.

Class participation assessment – Students basically start with full credit (30 points) at the beginning of the semester and are expected to participate in each week's class period. This will take various forms, depending on the topic being studies. Examples of class participation include asking questions, providing explanations of physiological processes either orally or through drawn explanations on a 'white board', participating in scientific discussions of course topics with the instructor and peer students. Throughout the semester, each student will be expected to explain a topic or physiological process to the class after completing the lecture and reading assignments for the chosen topic. Students who are unprepared to participate or do not show up for class will lose 2 points in this grade each week. Students who are unusually prepared and do a truly outstanding job may receive additional points at the instructor's discretion. A rubric for participation grading is shown below:

Excellent	30 pts	- Defines, describes, and illustrates concepts - Explains, assesses and criticizes ideas - Demonstrates preparation and reading of assignments
Good	26 pts	- Defines, describes, and illustrates concepts - Explains, assesses and criticizes ideas - Evidence of reading assignments, but not fully prepared
Reasonable	22 pts	- Defines, describes, and illustrates concepts - Explains, assesses, or criticize some ideas - Evidence of incomplete reading of assignments and preparation
Basic	18 pts	- Defines and describes some concepts - Explains but cannot assess and criticize ideas - Clearly unprepared and lacking evidence of reading assignments
Bare Minimum	15 pts	- Defines and describes some concepts - Unable to explain, assess, or criticize ideas - Clearly unprepared and lacking evidence of reading assignments
Unacceptable	0 pts	- Refuses to engage in discussion or answer questions when asked

		- Engaged into inappropriate behaviors (using cell phone, social media, visiting irrelevant websites) - Not present

GRADING SCALE

We will utilize the grading scale below for the final grade of the class:

Letter Grade	Percent of Total Points Associated with each Letter Grade	GPA Impact of Each Letter Grade
A	90.00 – 100%	4.00
B	80.00 – 89.99%	3.00
C	70.00 – 79.99%	2.00
D	60.00 – 69.99%	1.00
E	0.00 – 59.99%	0.00

More detailed information regarding current UF grading policies can be found here: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/. *Any requests for additional extra credit or special exceptions to these grading policies will be interpreted as an honor code violation (i.e., asking for preferential treatment) and will be handled accordingly.*

Weekly Course Schedule

WEEKLY SCHEDULE (updates and/or changes will be announced via CANVAS)

Week	**Dates**	**Lecture Topic** (required reading pages)	**Reading assignments**
1	Jan 12	Introduction to the Class and review of the central dogma of biology:	*Chapter 1*
2	Jan 19	No Class – Martin Luther King Jr. Holiday	
3	Jan 26	Chemical components of the cell and cell membranes	*Chapter 2*
4	Feb 2	Membrane transport and Membrane Potentials	*Chapters 11-12*
5	Feb 9	DNA, Chromosomes, Replication, RNA	*Chapters 5-7*
6	Feb 16	Control and Gene Expression	*Chapter 8*
7	Feb 23	Protein structure and the basic machinery of protein synthesis	*Chapter 4*
8	Mar 2	EXAM 1	

9	Mar 9	Introduction to Cell signaling and how cells “think”	*Chapter 16*
10	Mar 16	No Class – Spring Break!	
11	Mar 23	The cytoskeleton, molecular motors and how they are regulated	*Chapter 17*
12	Mar 30	The life and death of a cell and how it is regulated	*Assigned Articles on Canvas*
13	April 6	Redox biology	*Assigned Articles on Canvas*
14	April 13	Bioenergetics and mitochondrial function	*Assigned Articles on Canvas*
15	April 20	Make up time and carry over material	
16	April 27	Take home EXAM 2 DUE and Oral Exam Day	

SUCCESS AND STUDY TIPS

The instructor encourages you to learn to UNDERSTAND the material by listening, reviewing the lectures and performing the reading. Take the extra time to understand underlying mechanisms and worry less about memorizing. Terms are important because they are holding places for new concepts but they can always be looked up or googled. Concepts are harder to master and more important for this class.

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