

COURSE OVERVIEW

Natural and man-made changes in the environment can put tremendous stress on the ability of organisms to maintain homeostasis affecting human health, agriculture, and biodiversity. We will explore fundamental principles of cellular homeostasis and learn modern molecular and genetic research tools that are revealing unprecedented insights into how cells detect environmental stress and activate protective genes and proteins. You will participate in classroom discussions and laboratory activities focused on modern molecular genetics research. Experiments will be limited to non-vertebrate organisms including the model nematode *Caenorhabditis elegans*. We may also take field trips to sites that highlight environmental conditions in Florida and visit molecular genetic researchers.

MAIN OBJECTIVES

This course will introduce students to major concepts of stress biology with a focus on regulation of genes, and give students practical experience with molecular and genetic methods used to study gene regulation and function. Students will gain authentic research experience and prepare a written report and presentations. Experiments will be conducted with *C. elegans*.

COURSE SCHEDULE

Class will meet in Bartram Hall 617 MTWRF - Periods 6 – 8 (12:50 PM – 3:50 PM). If current conditions allow, field trips will last approximately 8 am to 6 pm.

Format – The course will include lectures and discussions to introduce topics and laboratory sessions to learn methods and complete experiments.

Prerequisites - Coursework in general biology is required and genetics is recommended (e.g., BSC2010 & 2011 and PCB 3063 or AGR 3303 or PCB 4522).

TENTATIVE SCHEDULE

Week 1 (1/08/24)

Objectives:

- Introduction to *C. elegans* biology, genetics, and fluorescent reporters
- Understand the rules and reasons of lab notebook keeping
- Mastery of dissecting scopes and mounting worms on slides and fluorescence
- Master pipetting, dilution, and replication
- Apply understanding of gene regulation, RNA processing, protein structure, and homeostasis to understand how cells respond to stress
- Fieldtrip/lab tours –TBA

Week 2 (1/15/24)

Objectives:

- Introduce and discuss metal homeostasis and regulation of stress responses

PCB4917, Molecular and Genetic Responses to Environmental Stress, 4 h

- Apply understanding of DNA structure and replication to understand transgene reporter generation
- Isolate gDNA from *C. elegans* using columns or lysates
- Master gel electrophoresis and analysis of data
- Select genes of interest, generate maps, and design primers for PCR fusion
- Master PCR (using GFP plasmid), gel electrophoresis, and analysis of data
- Fieldtrip/lab tours –TBA

Week 3 (1/22/24)

Objectives:

- Test student designed primers on gDNA and repeat and redesign as needed
- Attempt primer::GFP fusions and redesign and repeat as needed
- Discuss research paper and presentation requirements
- Fieldtrip/lab tours –TBA

Exam on Thursday 1/25

Week 4 (1/29/24)

Objectives:

- Repeat PCRs as needed
- Design and generate injection mixes
- Work on reports and presentations
- Fieldtrip/lab tours –TBA

Fieldtrip – 1/28 – TBA

Week 5 (2/05/24)

Objectives:

- Repeat PCRs as needed
- Design and generate injection mixes
- Work on reports and presentations

READINGS

There is no required textbook. Reading material and videos will be selected from available sources or provided.

GRADING

Online discussions	25
Lab participation and notebook	25
Quizzes and skill assessments	25
<u>Reports and presentations</u>	<u>25</u>
Total	100

Point Range (%)	Letter Grade
≥ 90.00	A
≥ 86.66	A-
≥ 83.33	B+
≥ 80.00	B
≥ 76.66	B-
≥ 73.33	C+
≥ 70.00	C
≥ 66.66	C-
≥ 63.33	D+
≥ 60.00	D
≥ 56.66	D-
< 56.66	E

Detailed grading policies for the University can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

POLICIES*Attendance and absences*

Attendance is mandatory. If a student needs to miss class for an excused absence, they must notify the instructor before ASAP before the scheduled class time to arrange make-ups and alternative assignments.

Class demeanor

Students will be expected to spend the majority of the week in class completing experiments and participating in discussions and presentations. Students will need to arrive on time. Cell phones are not to be used during presentations and discussions for personal reasons.

Communication with Dr. Choe

Written communication should be made in Canvas (e.g., mail and announcements) unless there is an emergency. If a student fails to check Canvas, the instructor is not responsible for missed information. Grades will only be made available in person or via Canvas.

Teacher 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/>.

Students with Special Needs

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center 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.

No accommodations are available to students who lack this documentation. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed.

UF counseling Services

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include: 1) UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services. 2) Career Resource Center, Reitz Union, 392-1601, career and job search services. Many students experience test anxiety and other stress related problems. "A Self Help Guide for Students" is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: <https://counseling.ufl.edu/>.

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.