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

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 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/or visit molecular genetic researchers.

MAIN OBJECTIVES

This course will introduce students to major concepts of stress biology with a focus on regulation and function of genes and proteins that promote cytoprotection. Students will gain 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 transgenic *C. elegans* strains.

COURSE SCHEDULE

Class will meet in Bartram Hall 617 and 321 MTWRF 6 – 8 (9:35 AM – 11:30 AM and 12:50 PM – 3:50 PM).

Format – The course will include 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

Objectives:

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

Week 2

Objectives:

- Introduce and discuss metal homeostasis and regulation of stress responses
- Discuss NUMR-1/2 and MYMR-3 pathway and potential projects

- Research potential environmental conditions and/or transgenes and strategies
- Apply understanding of DNA structure and replication to understand transgene reporters
- Practice dissecting scopes, mounting worms on slides, and imaging
- Write and/or present a mini-proposal for your potential project

Week 3

Objectives:

- Run preliminary and initial experimental trials
- Analyze imaging data, troubleshoot, adjust protocols as needed
- Repeat trials with optimizations as permitted

Week 4

Objectives:

- Repeat trials as needed
- Analyze data
- Write introduction and methods of reports
- Make introduction slides for presentations

Week 5

Objectives:

- Complete final trials as needed
- Complete final data analysis
- Write results and discussion of reports
- Finalize presentations and present

READINGS

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

GRADING

Lab participation and notebooks	33
Quizzes and skill mastery	33
Proposals, reports, and presentations	34
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 lass 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 are expected to spend most of the week in class completing experiments and participating in discussions and presentations. Students will be allowed to work outside of lab when doing literature research and developing proposals, reports, and presentations.

Students will need to arrive on time. Cell phones are not to be used during presentations and discussions.

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/.

University-wide Resources and Policies on Academic Honesty

https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/