

**Drosophila Neurogenetics: from Development to Function (GMS 6223- 2 credits)**  
**Spring 2015**

**Directors:**

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**Course description**

This 5-week (1-module) course will provide a comprehensive and detailed introduction to contemporary research on the genetics of *Drosophila* neurobiology. The course will be divided in three major sections covering: (A) the development of the CNS, (B) the dissection of neural circuits in the adult brain, and (C) the genetic basis of complex behaviors. The first section will cover neural induction, neuroblast specification, glia differentiation, axon guidance, and formation and function of the neuromuscular junction. The second will focus on the generation of the complex visual and olfactory organs and their underlying circuits, as well as the description of genetic tools for the dissection of other complex brain circuits. The final section will be devoted to describing the genetics and circuits controlling complex behaviors, including memory, courtship, aggression, sleep, and locomotion, as well as the genetic basis of neuronal degeneration. This comprehensive course will provide graduate students with a strong background on the genetic pathways that control the development of the CNS, the generation of brain circuits, and complex behaviors. Students will also learn about the evolutionary conservation of the genes and circuits that control the development and function of the *Drosophila* brain, and their relevance to their human correlates. Along the way, the students will absorb the genetic tools and methodologies applied in *Drosophila* research. The target audience for this course is second year IDP students of the Neuroscience and Genetics concentrations, and Master students from the Biotechnology and Biomedical Engineering programs. Only the core course GMS 6001 will be required, although basic genetics and neuroscience courses will be helpful.

**Lecture location and schedule:**

Neurology conference room, MBI L3-101

M/W/F lectures, 2 h each (pending confirmation of change)

**Textbook:**

No textbook required. Relevant papers will be selected for the students before the lectures

### **Student meeting/mentoring**

Course directors will be available to answer questions for a short time in the classroom following each lecture. Students can also schedule appointments for individual meetings.

### **LECTURE TOPICS**

#### ***A. Genetics of CNS development***

1. Neural induction in the Drosophila embryo- Mon Feb 9 Lecturer: PFF
2. Neuroblast specification in the embryonic CNS- Wed Feb 11 Lecturer: PFF
3. Axon guidance in the embryonic CNS- Fri Feb 13 Lecturer: DRL
4. Glial cell development and function- Mon Feb 16 Lecturer: DRL
5. Development and physiology of the neuromuscular junction- Wed Feb 18 Lecturer: PFF

#### ***B. Structure of the adult brain: building neural circuits***

6. Genetic tools to uncover neural circuits: lighting up the brain- Fri Feb 20 Lecturer: DRL
7. The compound eye and the visual circuit- Mon Feb 23 Lecturer: DRL
8. Dissection of adult brain centers by MARCM mosaics- Wed Feb 25 Lecturer: PFF
9. The chemosensory code: the genetic basis of smell and taste- Fri Feb 27 Lecturer: PFF

Mar 2-6 Spring Break

#### ***C. Genetic basis of complex behaviors***

- 10- Learning and memory: the mushroom bodies- Mon Mar 9 Lecturer: DRL
- 11- Courtship and aggression in Drosophila- Wed Mar 11 Lecturer: DRL
- 12- Sleep and circadian behavior in adult flies: the clock neurons- Fri Mar 13 Lecturer: PFF
- 13- Genetics of flight and locomotor behaviors- Mon Mar 16 Lecturer: PFF
- 14- Genetics of neurodegeneration- Wed Mar 18 Lecturer: DRL
- 15- Final exam- Fri Mar 20

### **Evaluation**

Class participation, including questions and comments, will contribute 20% to the final grade. Students will prepare a maximum of 2 presentations of recent/relevant papers related with the topic of the lecture depending on attendance. Presentations will contribute to 40% of final grade.

Students will also take a final exam that will contribute to 40% of final grade.

Class Participation: 20%

Paper presentations: 40%

Final exam: 40%

The grade scale for the course is as follows:

>90% = A, 86.7%-89.9% = A-, 83.3%-86.6%=B+, 80%-83.2%=B, 76.7%-79.9% = B-, 73.3%-76.6%=C+, 70%-73.2%=C, 66.7%-69.9% = C-, 63.3%-66.6%=D+, 60%-63.2%=D, 56.7%-59.9% = D-, 53.3%-56.6%=E+, 50% or less = E.

Grade Points for determining GPA will be calculated as follows, according to university policy: A minimum C will be required to pass the course

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|----------------------|-----|------|------|-----|------|------|-----|------|------|-----|-----|---|
| <b>Passing Grade</b> | A   | A-   | B+   | B   | B-   | C+   | C   | C-   | D+   | D   | D-  | S |
| <b>Grade Points</b>  | 4.0 | 3.67 | 3.33 | 3.0 | 2.67 | 2.33 | 2.0 | 1.67 | 1.33 | 1.0 | .67 | 0 |

**Attendance and Make-Up Policies:**

Students are expected to attend and participate in all class sessions. Personal issues with respect to class attendance or fulfillment of course requirements will be handled on an individual basis. Absences due to illness, professional travel, *etc.* will be excused per UF policy

**Accommodations for Students with Disabilities:**

To request classroom accommodation because of a disability, students must first register with the Dean of Students Office (<http://www.dso.ufl.edu/>). The Dean of Students Office will provide documentation to you, which you then give to the instructor when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework.