Genetics Lab

Fall Semester, 2014

Course Information

Course Title: Genetics lab (3 credits) Course Number: PCB 4067L-001-94723

Course Date: Aug. 23-Dec. 10,2014, Tuesday and Thursday, 9:30am -I 2:20pm

Course Location: Boca Campus, Sanson Life Science Building, Rm. l 08

Instructors: Dr. Kailiang Jia

Assistant Professor

Sanson Life Science Building

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Teaching Assistant:

Shweta Singh

Sanson Life Science Building, Room 253

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Office hours: Tuesday and Thursday, 1:OOpm-2:00pm

Course Description: This laboratory course is open to advanced undergraduates and graduate students. In this course students will gain significant experience in classical and molecular genetics using two powerful model systems, the roundworm *Caenorhabditis elegans* and fruit fly *Drosophila melanogaster.* Experiments will be performed to identify morphological and behavioral mutant phenotypes, investigate gene linkage and crossing over, establish dominant versus recessive and sex-linked versus autosomal inheritance, and generate genetic maps. In addition, DNA and RNA isolation, gel electrophoresis, fluorescence microscopy, PCR, RNA interference, and analysis of DNA sequences will be utilized to precisely map the position of genes on chromosomes, knockdown specific gene functions, analyze gene expression levels, and determine genotypes of different individuals.

Course objectives/student learning outcomes: By doing classical and molecular genetics experiments in this course, students are expected to learn how to interpret experimental data using basic genetic terms and Mendelian laws and understand the principles of RNAi and molecular genetics techniques.

Pre-requisite:Students must have already taken Introductory Biology (BSC 1010 and

1011). While it is preferable to have also completed Genetics (PCB 3063), qualified students currently enrolled in Genetics will be considered (please contact instructors).

Textbook & Materials Handout, online resources

Tentative Schedule (subject to change depending on course needs)

Week 1

Week2

Week3

Week4

WeekS

Week6

Week7

Aug. 26, 2014: Worm basics and manipulation

Aug. 28, 2014: Recognize wild-type *IA* hermaphrodites and males, and Dpy mutants, practice picking up worms

Sept. 2, 2014: Set up crosses: N2 male X *dpy-13* hermaphrodites

N2 male X *dpy-13 unc-24* hermaphrodites

Sept. 4, 2014: Set up crosses: N2 males X *dpy-11* hermaphrodites and

N2 male X *dpy-8* hermaphrodites

Sept. 9, 2014: (1) Examine X-linkage and mutation dominance

(2) Set up crosses:*dpy-131+* males X RW7000 and

*dpy-13 unc-24/++* males X RW7000

Sept. 11,2014: (1) Examine X-linkage and mutation dominance

(2) Pick up lA hermaphrodites progeny from *dpy-11* cross

Sept. 16, 2014:Pick up *IA* hermaphrodite progeny from *dpy-13* and

*dpy-13 unc-24* crosses

Sept. 18,2014: Score progeny of *dpy-11/+* and calculate ratio of progeny with different phenotypes (Lab report 1assignment)

Sept. 23,2014:(1) Pick up and freeze *dpy-13* progeny worms from *dpy-13/+*

hermaphrodites, worm lysis and run PCR

(2) Pick up and freeze *dpy-13* recombinant worms from

*dpy-13 unc-241+* + hermaphrodites

Sept. 25, 2014: (1) Analyze PCR products on DNA agrose gel

(2) *dpy-13* recombinant worm lysis and run PCR

(3) Set up bacteria feeding RNAi (GFP and *unc-22)*

Sept. 30, 2014: Analyze *dpy-13* recombinants PCR products on DNA agrose gel

(Lab report 1due; Lab report 2 assignment) Oct. 2, 2014: (1) score *unc-22* RNAi phenotype

(2) examine GFP intensity under stereo GFP microscope

(3) harvest GFP RNAi-treated worms and worm lysis

Oct. 7, 2014: Run worms lysis on PAGE and western transfer

Oct 9, 2014: Finish Western blot

(Lab report 2 due and oral presentation)

WeekS

Week9

Week 10

Week 11

Week 12

Week 13

Week 14

Week 15

Week16

Oct. 14, 2014: Overview of 2nd half of class Introduction to single gene traits Introduction to *Drosophila*

Oct. 16,2014: Characterization of wild type and anatomical mutant flies

Oct. 21, 2014: Set up *Drosophila* test and mapping crosses

Oct. 23, 2014: Analysis of larval polytene chromosomes

Oct. 28, 2014: GMO foods lab

Isolate DNA from control and test food sources-set up PCR

assays

Oct. 30,2014: Analyze of GMO PCR products via agarose gel electrophoresis

(Lab report 1 assignment)

Nov. 4, 2014: Isolation of *Drosophila* genomic DNA Set up PCR for *Drosophila* genes

Nov. 6, 2014: Analyze PCR products via agarose gel elecrophoresis

Nov. 11, 2014: Score test and mapping crosses

Nov. 13, 2014: Generate genetic map

(Lab report 1 due; Lab report 2 assignment)

Nov. 18,2014 Isolate human genomic DNA Nov. 20, 2014: PCR of human DNA repeat loci

Nov. 25, 2014: Purification ofPCR products- send out for DNA sequence analysis

Nov. 27, 2014: No class (Thanksgiving Break)

Dec. 2, 2014: Bioinformatic analysis of human DNA sequences

Dec. 4, 2014: (Lab report 2 due and oral presentation)

Final Exam Week

Assessment

In class experimental performance: Lab report:

Lab report presentation: Attendance:

20%

50%

20%

10%

Assignment of Grades

Percentage

93-100%

90- 92%

87- 89%

83- 86%

80- 82%

77- 79%

73- 76%

70- 72%

67- 69%

63- 66%

60- 62%

59% or less

Grade

A A­ B+

B B­ e+

c c­ o+

D

o-

F

Policy on absences, makeup tests, late work, and incompletes

Absences for which a medical or court excuse is provided (professional letterhead required) will be recorded but not figured in the attendance grade. Likewise, one absence for which advance notice is given by phone or in person will not be figured in the attendance grade. Students will be given the opportunity to make up exams missed only during excused absences. Any significant tardy or early departure from class will be figured as one absence. Three absences will result in grade F. An Incomplete (I) will be given to students who, at the end of the course, have not completed all of the required course work due to exceptional circumstances, but otherwise have passing grades.

Students with Disabilities

In compliance with the Americans with Disabilities Act (ADA), students with a disability who require reasonable accommodations to properly execute coursework must register with the Office for Students with Disabilities (OSD) -in Boca Raton SU 133 (561-297-

3880); in Davie, LA 240 (954-236-1222); in Jupiter, SR 110 (561-799-8010) -and

follow all OSD procedures.

Religious Accommodations

Students who wish to be excused from course work, class activities or examinations must notify the instructor in advance of their intention to participate in religious observation and request an excused absence.

Code of Academic Integrity policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University

Regulation 4.001 at <http://www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf>