

FLORIDA ATLANTIC UNIVERSITY™

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Graduate Programs—NEW COURSE PROPOSAL¹

DEPARTMENT: BIOLOGICAL SCIENCES

COLLEGE: CHARLES E. SCHMIDT COLLEGE OF SCIENCE

RECOMMENDED COURSE IDENTIFICATION:

PREFIX BSC COURSE NUMBER 5038 LAB CODE (L or C) L

(TO OBTAIN A COURSE NUMBER, CONTACT MJENNING@FAU.EDU)

COMPLETE COURSE TITLE: GENETICS LAB

EFFECTIVE DATE

(first term course will be offered)

FALL 2014

CREDITS ²: 3

TEXTBOOK INFORMATION: **ESSENTIAL DEVELOPMENTAL BIOLOGY**, JONATHAN SLACK
 3RD EDITION 2012 WILEY-BLACKWELL PRESS
 ISBN #: 978-1-1180-2286-3

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR SATISFACTORY/UNSATISFACTORY _____

COURSE DESCRIPTION, NO MORE THAN THREE LINES:

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.

PREREQUISITES*:

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).

COREQUISITES*:

REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)*:

* PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE: SPECIALIZATION IN THE PERTINENT FIELDS, CONTINGENT UPON DEPARTMENTAL APPROVAL

Faculty contact, email and complete phone number:

Kailiang Jia, M.D., Ph.D.
KJIA@fau.edu
 (561) 297-0512

John R. Nambu, Ph.D.
JNAMBU@fau.edu
 (561) 297-3926

Please consult and list departments that might be affected by the new course and attach comments.³

Department of Biological Sciences: This course was previously a Special Topics and needs a new course number.

Approved by: Department Chair: <u>AK. King</u> College Curriculum Chair: _____ College Dean: _____ UGPC Chair: _____ Graduate College Dean: _____ UFS President: _____ Provost: _____	Date: <u>3-21-12</u> _____ _____ _____ _____ _____	1. Syllabus must be attached; see guidelines for requirements: www.fau.edu/provost/files/course_syllabus.2011.pdf 2. Review Provost Memorandum: Definition of a Credit Hour www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf 3. Consent from affected departments (attach if necessary)
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Email this form and syllabus to UGPC@fau.edu **one week before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

Genetics Lab

Fall Semester, 2014

Course Information

Course Title: Genetics Lab (3 credits)

Course Number: BSC-5038L-001-93934

Course Date: Aug. 23 – Dec. 10, 2014, Tuesday and Thursday, 9:30am – 12:20pm

Course Location: Boca Campus, Sanson Life Science Building, Rm. 108

Instructors:

Dr. Kailiang Jia Assistant Professor Sanson Life Science Building Rm. 261 Email: kjia@fau.edu Phone: (561) 297-0512 Office hours: Tuesday and Thursday, 1:00pm – 4:00pm or by appointment	Dr. John Nambu Professor Sanson Life Science Building Rm. 206 Email: jnambu@fau.edu Phone: (561) 297-3926 Office hours: Tuesday and Thursday, 1:00pm – 4:00pm or by appointment
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Teaching Assistant: Shweta Singh
Sanson Life Science Building, Room 253
Email: ssingh34@fau.edu Phone: (240) 431-8420
Office hours: Tuesday and Thursday, 1:00pm – 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 Aug. 26, 2014: Worm basics and manipulation
Aug. 28, 2014: Recognize wild-type L4 hermaphrodites and males, and Dpy mutants, practice picking up worms
- Week 2 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
- Week 3 Sept. 9, 2014: (1) Examine X-linkage and mutation dominance
(2) Set up crosses: *dpy-13/+* males X RW7000 and
dpy-13 unc-24/++ males X RW7000
Sept. 11, 2014: (1) Examine X-linkage and mutation dominance
(2) Pick up L4 hermaphrodites progeny from *dpy-11* cross
- Week 4 Sept. 16, 2014: Pick up L4 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 1 assignment**)
- Week 5 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-24/+ + 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*)
- Week 6 Sept. 30, 2014: Analyze *dpy-13* recombinants PCR products on DNA agrose gel
(**Lab report 1 due; 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
- Week 7 Oct. 7, 2014: Run worms lysis on PAGE and western transfer

	Oct 9, 2014: Finish Western blot (Lab report 2 due and oral presentation)
Week 8	Oct. 14, 2014: Overview of 2 nd half of class Introduction to single gene traits Introduction to <i>Drosophila</i> Oct. 16, 2014: Characterization of wild type and anatomical mutant flies
Week 9	Oct. 21, 2014: Set up <i>Drosophila</i> test and mapping crosses Oct. 23, 2014: Analysis of larval polytene chromosomes
Week 10	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)
Week 11	Nov. 4, 2014: Isolation of <i>Drosophila</i> genomic DNA Set up PCR for <i>Drosophila</i> genes Nov. 6, 2014: Analyze PCR products via agarose gel electrophoresis
Week 12	Nov. 11, 2014: Score test and mapping crosses Nov. 13, 2014: Generate genetic map (Lab report 1 due; Lab report 2 assignment)
Week 13	Nov. 18, 2014: Isolate human genomic DNA Nov. 20, 2014: PCR of human DNA repeat loci
Week 14	Nov. 25, 2014: Purification of PCR products – send out for DNA sequence analysis Nov. 27, 2014: No class (Thanksgiving Break)
Week 15	Dec. 2, 2014: Bioinformatic analysis of human DNA sequences Dec. 4, 2014: (Lab report 2 due and oral presentation)
Week 16	Final Exam Week

Assessment

In class experimental performance:	20%
Lab report:	50%
Lab report presentation:	20%
Attendance:	10%

Assignment of Grades

Percentage	Grade
93 – 100%	A
90 – 92%	A ⁻
87 – 89%	B ⁺
83 – 86%	B
80 – 82%	B ⁻
77 – 79%	C ⁺
73 – 76%	C
70 – 72%	C ⁻
67 – 69%	D ⁺
63 – 66%	D
60 – 62%	D ⁻
59% or less	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/ctl/4.001_Code_of_Academic_Integrity.pdf



Charles E. Schmidt College of Science
Department of Biological Sciences
777 Glades Road
Boca Raton, FL 33431
tel: 561.297-3320
fax: 561.297-2749

TO: University Graduate Programs Committee (UGPC)
FROM: Rodney Murphey, Ph.D.
Professor and Chair
Department of Biological Sciences
DATE: February 19, 2014
RE: New Course Proposal Consent

To Whom It May Concern:

This note constitutes acknowledgement and consent of the Department of Biological Sciences for the creation of a new course within the department: **BSC 5038L – Genetics Lab.**

Best Regards,

A handwritten signature in blue ink, appearing to read 'R. Murphey', is written over the printed name and title below.

Rodney Murphey, Ph.D.
Chairman, Department of Biological Sciences
Director, Life Science Initiative on the MacArthur Campus