**FLORIDA ATLANTIC UNIVERSITY**

Graduate Programs—NEW COURSE PROPOSAL

DEPARTMENT: BIOLOGICAL SCIENCES

RECOMMENDED COURSE IDENTIFICATION:

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

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

COMPLETE COURSE TITLE: GENETICS LAB

CREDITS: 3

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

EFFECTIVE DATE
(first term course will be offered)

FALL 2014

GRADING (SELECT ONLY ONE GRADING OPTION):

REGULAR X 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:

Kailibing 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.

Department of Biological Sciences: This course was previously a Special Topics and needs a new course number.
<table>
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<tr>
<th>Approved by:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Department Chair:</td>
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<tr>
<td>College Curriculum Chair:</td>
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<td>College Dean:</td>
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<td>UGPC Chair:</td>
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<td>Graduate College Dean:</td>
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<td>UFS President:</td>
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3. Consent from affected departments (attach if necessary)

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

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 agarose 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 agarose 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 2nd half of class
  Introduction to single gene traits
  Introduction to Drosophila
Oct. 16, 2014: Characterization of wild type and anatomical mutant flies

Week 9
Oct. 21, 2014: Set up Drosophila 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 Drosophila genomic DNA
  Set up PCR for Drosophila 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. 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

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<tr>
<td>60 – 62%</td>
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<tr>
<td>59% or less</td>
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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
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,

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