Course Syllabus Special Topics in Biology-Applied Genetics Spring 2017

Course Information

Class Section: BIOL 4V00.002 Location: SLC 1.214 Time: Mon and Wed 10AM to 11.15AM

Instructional Team Contact Information

Professor: Vinita Hajeri, PhD

Email: <u>vinita.hajeri@utdallas.edu</u> Office Room # FN 3.308E Office hours: Please email for an appointment

Teaching Assistant: Kristen Newton

Email: <u>kln160030@utdallas.edu</u> Office Room # FN 3.308R Office hours: Please email for an appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions BIOL1, BIOL2 and BIOL Lab

Course Description

Genetic model organisms such as the flatworm (*Planaria*), fruit fly (*Drosophila melanogaster*), nematode (*Caenorhabditis elegans*), and the zebrafish (*Danio rerio*) are the cornerstones of biomedical research. These organisms known for their simplicity of structure and gene similarity to humans have been seminal in advancing our understanding of many biological processes and human diseases. In this inquiry-based course, learners will apply basic principles of genetic model systems, transmission genetics, and molecular genetics to investigate important biological concepts such as embryonic cell division, stem cells and regeneration, Mendelian inheritance, gene mutations and phenotypes. Throughout this exploratory course, students will gain practical hands-on experience conducting basic culturing, genetic manipulation and phenotypic analysis necessary to utilize genetic model organisms in their investigation. Learners will engage in class discussions and activities to draw connections between the concepts learned in class and their real-time application(s) in biomedical sciences.

Student Learning Objectives/Outcomes

Upon completion of this course students will be able to:

- Understand and explain the use and value of model organisms such as *Planaria*, *Drosophila*, *C.elegans* and *Zebrafish* in the analysis and elucidation of biological principles.
- Master basic culturing, genetic manipulation and phenotypic analysis techniques in handling genetic model organisms.
- Understand the nature scientific method, to examine and incorporate primary literature in the formulation of hypotheses and testing the hypothesis.
- Analyze and interpret the data collected in the laboratory experiments.
- Develop scientific writing skills by working on activity handouts, report and . and maintaining a lab notebook.
- Communicate and present on a topic related to genetics.

Course Mechanics

Attendance

Regular attendance and punctuality are imperative to success in this course because most class periods involve working with live organisms, it is impossible to make up for hands-on activities.

The student is responsible for signing in each class period. Students are awarded full points toward their final grade at the beginning of the semester. For each absence, one point will be deducted from this total and half a point will deducted for arriving to class late or leaving before the class has been dismissed. *Students arriving more than ten minutes late to class will be considered absent.* Students are allowed one absence during the semester without penalty.

If you have a legitimate reason for missing class (sickness) it is your responsibility to inform the instructional team (TA and the instructor) as soon as possible. The student needs to provide appropriate documentation to prevent attendance and participation points from being deducted.

Work outside of the regular class period

Experiments involving live, developing organisms cannot be restricted to the class period. It is unavoidable that students will be required to come to class outside the regular class time to set up or complete parts of an experiment or project. It is important to consider the developmental life cycle of the organism while you plan your work.

Scheduling work outside of class time to use the SLC Classroom and Equipment.

If you need to use the SLC Lab and/or equipment outside of class time, contact the TA far in advance (minimum 48 hours' notice is required) to arrange time in the classroom. A Google calendar will be posted on e-learning to schedule time for work outside the class period. When scheduling lab time, students should communicate what procedures will be performed, what supplies will be needed and an estimate of how long the procedure will take. A <u>no show</u> after scheduling an outside of class work time will lead to a deduction in participation points.

Class periods

Class periods will mainly include the following: Quiz, a short lecture by the instructor, a demonstration by instructor followed by hands-on activities involving observation and experimentation with living material. At the beginning of each class period, we will have a short discussion over what will be done that day and whether any work outside the scheduled class period will be necessary.

This course requires students to actively engage in class discussions with the instructor and peers. The course is designed for students to capitalize on the creative and discovery aspect of science. Please feel free to help your peers, discuss one's finding's, and, especially to share viewing of any particularly clear, extraordinary or spectacular sights you observe under the microscope. We suggest that whenever possible (time and materials) allowing you make observations more than once. More often, you will see things you didn't see the first time around because now you are more familiar with the subject.

Working with model organisms such as *Planaria, Drosophila, C. elegans* and *Zebrafish* requires some manual dexterity, which most students can learn with instruction, care, and some practice. Please don't become frustrated if you can't do something right away. It is important to understand that once you have mastered the feat of handling these organisms it allows you to make interesting observations and perform fascinating experiments to gain greater understating of complex biological processes.

Course material

Class material will be posted on *e-learning*. Please check course home page for updates and announcements. It is <u>essential</u> that you review the handout for the class period before coming to class and actively engage in class discussions. Additionally, students will be directed to learning resources on the web and given journal articles as take home assignments.

Activity handouts

Each handout reviews a specific content area covered in class and is <u>due next class</u> <u>period</u>. In order to receive full credit for each question, *you must thoroughly address each question*. Students not present for in-class activities will not be permitted to submit the handout questions for full credit. Absentee students can work on the activity handout and turn it in for 5 points in lieu of 10 points.

Group Work:

In-class activities and outside class work emphasize teamwork and collaborative aspect of science. Students will be assigned into groups of 3-4 students at the beginning of each model organism unit. All group members are expected to contribute equally to the work. Lack of participation will result in a deduction of participation points.

It is the responsibility of group members to schedule time for out of class work so that all members effectively contribute. During the semester you will be generating data as a group, but the actual production of the proposal and written work in handouts is an individual effort and not collaboration with others. Under situations where you are unable to complete an assigned task for your group it is your responsibility to discuss your situation with the group members and make necessary alternative arrangements.

Homework

Will be due during class time. In class and e-learning announcements will be made.

Drosophila Project work and Report

The Drosophila project is a group project and will be mainly carried out outside of class time. This project will span over a period of 4 weeks. See scheduling work outside of class time for effective policies. Any guidance needed with regards to the Drosophila project will be provided by the instructional team.

Group members are responsible for working as a cohesive team (see group work policies). Group members will collect data for this project as a team however, report writing is an individual effort. A detailed outline and rubric will be provided on e-learning. Students are expected to follow these guidelines.

Detailed feedback on the draft report will be provided. You are expected to implement changes suggested by the instructional team. Failure to incorporate the given feedback in the final version of the report will result in a deduction of points. The final reported is expected to be a polished and finished work on the Drosophila project. Any email questions will be answered within 24 hours. *No suggestions/feedback will be given by the instructional team 24 hours before the due date so plan accordingly!*

The Drosophila report is a TurnItIn submission on e-learning. A draft write-up that attracts attention based on a TurnItIn score will be returned with a grade of zero with the opportunity to rewrite and earn full credit for the draft. The returned draft will contain the usual edits. Any subsequent draft with a high TurnItIn score will earn an automatic zero with no opportunity to resubmit. Any final write-up with an excessive TurnItIn score will be returned with a zero and no opportunity to resubmit. Effective techniques to avoid TurnItIn complications are discussed in class. The determination of an "excessive" score resulting in a zero for that assignment is the result of a unanimous vote by the instructional staff.

Group Presentations on "Zebrafish models of Biomedical research" Groups are required to get the topic approved by the instructional team by the specified date. Every group member is expected to participate and contribute towards developing and presenting the topic. A detailed rubric will be provided to guide students regarding expectations and grading policy.

Miscellaneous Information

Instructional Team Responsibilities

In order to run this course in the most effective manner possible, the members of the instructional team Dr. Hajeri and teaching assistant for this course Ms. Kristen Newton work closely on the content and execution of curriculum. We will provide you with feedback on your proposal, quizzes, handouts, and assignments. Dr. Hajeri is in charge of the course content and its delivery, setting up exams, quizzes, assignments and class policies. Ms. Newton is responsible for monitoring your attendance/tardies, grading homework assignments, activity handouts, and Drosophila report.

Email Policy

All emails to the instructional team should be addressed to both, Vinita Hajeri and Kristen Newton. Additional recipients should be included as appropriate. Emails will generally be answered within 24 hours, Monday through Friday during normal business hours (8am –5pm). Emails will not be answered on weekends, so plan accordingly.

Assignments & Academic Calendar

(Topics, Reading Assignments, Due Dates, Exam Dates)

| Date | Activity & Assignment Schedule | Quizzes and Assignment Due |
|---------|---|------------------------------------|
| | | Handouts are due next class period |
| 1/9/17 | Introduction to Genetic Model Organisms | |
| 1/11/17 | Model organisms continued | |
| 1/16/17 | No Class MLK Holiday | |
| 1/18/17 | Stem Cells and Regeneration | Model Organisms assignment due |
| 1/23/17 | Introduction to Planaria Regeneration in Planaria | Stem Cells assignment due |
| 1/25/17 | Finalize Planaria results | |
| 2/30/17 | Genetics Problems | Quiz on Planaria and Stem cells |
| 2/1/17 | Genetics Problems continued | |
| 2/6/17 | Drosophila Melanogaster Fly Project and Mendelian Modes of Inheritance Drosophila husbandry | Genetics homework due |
| 2/8/17 | Drosophila project outline Setting up Crosses | |
| 2/13/17 | Drosophila Project Continued | |
| 2/15/17 | Chi Square Analysis | |

| 2/20/16 | Culturing and observing Caenorhabditis elegans | Quiz Drosophila |
|---------|---|--|
| | C. elegans introduction and husbandry Observing morphology, life cycle and behavior of wild-type worms. | |
| 2/22/16 | Genetic mutant phenotype analysis in C. elegans | |
| 2/27/17 | C. elegans Genetics C. elegans Genomics- Wormbase | Quiz C. elegans Draft Drosophila Report due |
| 3/1/17 | C. elegans mating crosses | C. elegans assignment due |
| 3/6/17 | Midterm Exam | |
| 3/8/17 | RNA interference RNAi concept and mechanism | Final Drosophila report due. |
| 3/13/17 | Spring Break | |
| 3/20/17 | RNAi in <i>C. elegans</i> | RNAi assignment due |
| 3/22/17 | RNAi in C. elegans continued Wormbase Activity, formulating hypothesis RNAi results discussion | Zebrafish presentation topic approval |
| 3/27/16 | Introduction to Zebrafish Zebrafish husbandry and setting up of mating crosses | Quiz RNAi |
| 3/29/17 | "Zebrafish models of biomedical research" group presentations | |
| 4/3/17 | Zebrafish Developmental Biology Staging of zebrafish embryos | |
| 4/5/17 | Staging of zebrafish embryos finalize observations | Quiz Zebrafish |

| 4/10/17 | Molecular Genetics-Genotyping Tail Clip and Lysis | |
|---------|--|----------|
| 4/12/17 | PCR set up | |
| 1/17/17 | Gal alastrophorosis | Quiz PCP |
| 4/1//1/ | Gerelectrophoresis | |
| 4/19/17 | Run Gel- Analyze results | |
| 4/24/16 | Exam 2(Cumulative) | |

Please note that the schedule of class topics listed above is tentative and subject to change. Note the changes to assignments and homework will be made as necessary. The instructor tries best to discuss current research findings in class.

Grading Policy

| Grade Category | Total Points |
|--|--------------|
| 6 Quizzes (15 points each) | 90 points |
| 20 Handouts (10 points each) | 200 points |
| Homework/ take home assignments | 100 points |
| Drocophilo Project | 250 pto |
| Draft Report 50 points Final Report 100 points | 200 pts |
| Participation in project 100 points | |
| Exams and Presentation: | 170 points |
| Midterm Exam: 60 pts | |
| Final Exam: 60 pts | |
| Presentation 50 pts | |
| Attendance | 50 points |
| Allendance | 50 points |
| Participation in Class activities (10 points per unit) | 100 points |
| TOTAL | 960 points |

Please note that grading policy is subject to change! Note that adjustments to grading points may be required if assignments are altered. The instructor tries best to discuss latest research findings in class.

Late work Policies

<u>Only work submitted through eLearning will be graded.</u> All work must be submitted in a timely manner. A late penalty of 10% per day will apply to late work being submitted to the instructional team for grading.

Redo Policies

With instructor permission, some work may be redone and resubmitted in a timely manner. If you are seeking to resubmit work more than once, you must arrange a meeting with the instructional team.

Missed Quizzes

If you miss a quiz, you are responsible for contacting the TA for a re-take within one week of the missed class period. No more than 2 quizzes can be re-taken in a semester.

Missed class participation and handouts

If you missed class you can work on the activity handout and turn it in for 5 points in lieu of 10 points. <u>There is no makeup for missed attendance and participation points</u>.

Participation Rubric: Students are graded on:

Overall Class participation points are earned by:

(1) Responding to questions or discussion to demonstrate understanding of the topic. Volunteer relevant and interesting ideas during class discussion.

(2) Participates in hands on activity, and in keeping lab area clean after segments are finished

(3) Observes safety rules at all times during class activities

(4) Student is not late or does not leave early before class has ended

(5) Student does not exhibit disruptive behavior towards TA or towards group members

Course & Instructor Policies

- Only students enrolled in class are permitted in the classroom.
- Collaborations with students not enrolled in the course are not permitted.
- Students are responsible for leaving their workstations clean and orderly for the next section. Observation of safety and cleanliness is part of your grade! The TA should NOT have to pick up after you. You must leave the classroom as it was when you entered.
- Close-toed shoes that fully cover the feet must be worn at all times.
- No unauthorized experiments to be performed.
- No unauthorized use of equipment.
- Follow carefully instructions for disposal of glass, living organisms etc.
- You will be prepared to participate in class by having read the class material, assigned readings, and completed any assigned tasks before the class meeting.
- Quizzes and exams must be taken when scheduled.
- Cheating will NOT be tolerated. Anyone caught cheating (all forms) will receive a grade of zero and the matter will be turned over to the Dean of Students.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.