



EAST TENNESSEE STATE
UNIVERSITY

College of Arts and Sciences
Department of Biological Sciences

BIOL 3141- Genetics Lab FALL 2022

Class 2.00pm- 4.50 222 Brown Hall

Instructor – Dr. Ekaterina N. Kaverina, cell 4237411019, kaverina@etsu.edu.

No office hours, just email me. We can meet by appointment if needed.

Our plan includes 2 genetic experiments on *Drosophila melanogaster*, 5 experiments on other materials and a session in the computer lab. A genetic experiment routinely takes more than one lab session and can last several days.

Laboratory reports. Four experiments will require formal lab reports which should follow standard scientific paper plan (Introduction, Materials and Methods, Results, Discussion, Conclusions). The Introduction must explain the aim of the experiment, hypotheses tested, and the importance of the task. The Methods section must explain clearly and completely what we did. The Results should present your data completely and comprehensively; no interpretation, – this is reserved for the Discussion which should also explain the meaning of your findings in connection with the general picture. Your list of references needn't be long, a few are enough. *Lab reports are to be submitted electronically on D2L; due the week after the experiment has been completed.* I will allow 1 (one) resubmission with corrected mistakes. Resubmissions are generally due 1 week after my feedback. Please read my feedback!

There will be a total of 4 written homework assignments, on a smaller scale than a lab report, think worksheets.

Folders will be created in the d2l dropbox for all reports and homework sheets. **Electronic**

submissions only!

I cannot accept late submissions.

There will be no quizzes in class this year. I will ask you questions after class, creating a d2l folder for you to answer them. They are checking your understanding of the concept revealed in the experiment and the approaches used - will more or less follow the “lectures” on appropriate topics. Not every time, not every time, but many class sessions will be followed by this kind of “take-home quiz”. They will be more or less 10 points each, it's not set in stone and I can change it. There will be no make-up for these. *All tests this term are fully open – yes, you can use anything.* Anything online, your own notes, my slides, books... But no teamwork *at the time of*

test! I would like to encourage studying together as you prepare for the tests. But the tests have to be answered independently. Aren't you interested to see the results?

Plagiarism is not tolerated at ETSU. The instructors reserve the right to use plagiarism detection technology. Cheating of any kind will result in a zero for the task in question or an F for the entire course.

Cheaters may be referred to the Department Chair and the Dean of the College of Arts and Sciences.

Grading :

6 take-home quizzes x 10 pts = 60 points;

4 formal lab reports x 15 points = 60 points ;

4 HW assignments x 5 points = 20 points ;

Lab exam = 70 points.

Total = 210 points.

90 – 100% → A ; 80 – 90% → B ; 70 – 80% → C ; 60 – 70% → D ; less than 60% → F. And I mean it.

Top and bottom 1/3 of each bracket are +'s and -'s, respectively (No A+ or D-)

Please ask me any questions.

LEARNING OUTCOMES:

Topics associated with the learning outcomes in the Biology Curriculum that might be considered a minimal degree of knowledge and comprehension for a student having completed the Genetics Laboratory class:

1. Students can explain the factors that cause change in genetic structure over time.
2. Students can explain the flow of genetic information among levels of biological organization.
3. Students will be able to use phylogenies to interpret patterns of evolution and relationships among organisms.

SKILLS: *By the end of the course, students will be able to:*

- Understand hypothesis-driven and evidence-based research.
- Identify accurate and reliable sources of information.
- Apply rigorous experimental design and data collection.
- Evaluate scientific results in context of methods or protocols used.
- Construct appropriate and testable hypotheses and derive predictions.
- Use effective representations and visualizations for biological data.
- Articulate methods and knowledge in written and oral forms.
- Interpret data from various sources to develop an appropriate conclusion and recognize knowledge gaps.
- Apply statistical and bioinformatics tools to analyze and interpret diverse biological data.
- Apply biological research to address societal problems.

Proposed schedule, subject to changes.

Date	Theoretical introduction	Drosophila	Other	Due	"Homework quiz"
Aug 23	Bioinformatics. Will be at the computer lab.		Bioinformatics practical task. Homework due next week.		
Aug 30	Mendel's laws. Drosophila. Chi square.	Learn to handle and sex flies, observe mutants. Setup Drosophila dihybrid crosses		Bioinformatics homework	Mendelian genetics. Chi square.
Sept 6	Alleles. Polymorphism. Genetic equilibrium in populations		<i>Human Hemoglobin, homework due next week</i>	Hemoglobin homework	Hemoglobin and equilibrium
Sept 13	DNA restriction and its uses (recombinant DNA technology)	Drosophila <i>dihybrid cross</i> : collect F1, setup F2.	Plasmid restriction mapping – restriction only		Restriction mapping
Sept 20			<i>Plasmid restriction mapping – run gel. Homework due next week.</i>		
Sept 27		Count F2 in the <i>dihybrid cross</i> , report due next week		Restriction mapping homework	
Oct 4	Mapping in eukaryotes. X-linkage.	Setup Drosophila <u>3-pt cross</u> .		Dihybrid report.	Linked genes and sex determination.
Oct 18		Collect 3pt F1, start F2			
Oct 25	Bitter taste receptor gene, PCR and RFLP		Bitter taste receptor gene: DNA isolation and amplification		PCR and RFLP
Nov 1		<u>3-pt cross</u> : collect and analyze F2. report due next week	Bitter taste receptor gene: DNA restriction.		
Nov 8	Fungi, tetrad analysis and centromere mapping		Set up <u>Sordaria</u> cross. <u>Bitter taste receptor gene</u> : electrophoresis and data analysis – report due next week	Drosophila mapping report	Asci and centromere mapping.
Nov 15			Analyze <u>Sordaria</u> . <u>Report due next week</u>	. Bitter taste receptor gene report	
Nov 22	Cytogenetics		Cytogenetics; homework due next week	Sordaria report	
Nov 29	Lab final			cytogenetics homework	

SAMPLE