California State University, Los Angeles

Department of Biological Sciences

BIOL 3401-01

Molecular and Cellular Laboratory

Spring, 2023

# COURSE INFORMATION

## Instructor Information

**Instructor**: Amelia Russo-Neustadt, MD, PhD

**Office Location**: LKH 217

**Telephone**: (323) 343-2074 **Email**: arusson@calstatela.edu

**Office Hours**: Mondays 9:45 to 10:45 AM

## General Course Information

**Class Days/Time**: MW 10:55 AM to 1:25 PM

**Classroom**: ASCB 263

## Course Description

This is an advanced undergraduate laboratory course designed to provide a firm foundation in Cellular Biology and Genetics and the application of this knowledge to a modern understanding of the Eukaryotic Cell.

Laboratory activities involve hands-on experience with techniques and instrumentation used in research and builds upon class lecture material in cell biology and genetics.

## Student Learning Objectives and Course Learning Objectives/Outcomes

This course informs students about the structural organization, function and regulation of major components of the eukaryotic cell as well as the processes of cell genetics and heredity. The lab will emphasize techniques in spectrometry, cell fractionation, centrifugation, photosynthesis, Drosophila growth and reproduction and genetic studies. An important component of the lab will be to write lab reports in a concise, clearly written and well-organized format.

### Student Learning Outcomes

Upon successful completion of this course, students will be able to:

* Become proficient in the theory, and use, of a number of Cell Biology/Genetic instruments and techniques.
* Become proficient in handling and rearing laboratory fruit flies and tracing their genetic traits and histories.
* Become proficient in taking laboratory notes and in writing a clear and concise scientific lab report.

## Course Structure

This course is to be conducted entirely in-person with hands-on laboratory exercises. Materials and announcements will be available through [Canvas](https://canvas.calstatela.edu/).

# REQUIRED COURSE MATERIALS

## Lab Manual:

Available through Canvas

This manual includes required readings as well as instructions for the in-class exercises. Students are expected to read the material for each day’s activity prior to the start of class.

## Computer Requirements

You will need to have an up-to-date browser, operating system and some additional software on your computer to access Canvas. Check the [ITS Helpdesk Student Resources page](http://www.calstatela.edu/its/helpdesk/studentresources). Some of the documents in this course will be available to you in PDF form. You will need to download and install [Adobe Acrobat Reader software](https://get.adobe.com/reader/) on your computer.

# COURSE POLICIES

Attendance and participation are required in this class. Make-up laboratory exercises are not available, so communicate with as much advance notice as possible if you must miss a class, so that reasonable alternative arrangements may be made.

# ASSIGNMENTS AND GRADING POLICY

Dates for laboratory exercises and due dates for reports are indicated in the schedule below. Quizzes will be given at the beginning of class (in-person, on paper) at the start of each new exercise. Students are also expected to keep a handwritten laboratory notebook with up-to-date entries (see lab manual for guidelines). Your notebook will be checked periodically for credit. Lab reports will be uploaded to Canvas on or before the due date. Near the end of the semester, there will be an in-person final exam with both written and laboratory practical components. A study guide and review will be provided.

## Grading Criteria

You can view your grades using the GRADES button in the Canvas course navigation. Please check your grades regularly to make certain that I have received all your assignments. If you have a question about a grade, email me at [arusson@calstatela.edu](mailto:arusson@calstatela.edu).

|  |  |
| --- | --- |
| Assignments | Points |
| Lab reports (4 X 25) | 100 |
| Quizzes | 30 |
| Notebooks | 20 |
| Final Lab Exam | 60 |
|  |  |
| Total: | 210 |

## Grading Scale

|  |  |
| --- | --- |
| Letter Grade | Percentage of Points |
| A | 90-100% |
| B | 80-89 % |
| C | 70-79 % |
| D | 60-69% |

To help understand how to read and access your grades on Canvas, explore this question: <https://community.canvaslms.com/docs/DOC-16532-4212829286>

## Rubrics

A grading rubric for laboratory reports is provided on Canvas.

# HELPFUL STUDENT RESOURCES

## Technical Resources

Information on Cal State LA technical support resources for students: [Technical Support Resources](http://www.calstatela.edu/its/helpdesk/studentresources)

## Student Support Resources

Information on Cal State LA student support resources for students: [Student Support Resources](http://www.calstatela.edu/cetl/student-support-resources)

## Academic Support Resources

Information on Cal State LA academic support resources for students: [Academic Support Resources](http://calstatela.edu/cetl/academic-support-resources)

### Center for Academic Success

The Center for Academic Success (CAS) supports all students throughout their educational journey. You are encouraged to visit a CAS tutor for STEM, social science, or writing tutoring early in the semester. The academic services CAS provides are inclusive, engaging, challenging, and impactful. CAS tutors offer a one-on-one opportunity to discuss your assignments and will provide you with tools to become an independent scholar. The appointments are 30 minutes long. Log on to the Student Success Collaborative portal [to make an appointment online](http://www.calstatela.edu/undergraduatestudies/student-success-collaborative-ssc).

## Canvas Student Support

Information for students on how to use Canvas:

* [Canvas Student Guide](https://community.canvaslms.com/docs/DOC-10701)

## Glazer Family Dreamers Resource Center

The [Erika J. Glazer Family Dreamers Resource Center](http://www.calstatela.edu/gfdrc) promotes the success of undocumented students and students from mixed-status families at Cal State LA through a variety of resources, services, and community engagement opportunities. Such programs and services are weekly immigration legal clinics, California Dream Act Application for Financial Aid Assistance, and professional and academic development workshops.

# UNIVERSITY POLICIES

## Student Conduct

Information on student rights and responsibilities, standards of conduct, etc., can be found by visiting the Cal State LA [University Catalog Appendices](http://ecatalog.calstatela.edu/content.php?catoid=26&navoid=2721).

## Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Students should be aware of the current deadlines and penalties for adding and dropping classes by visiting the [GET home page](https://cmsweb.calstatela.edu/psp/CLAPRD/?cmd=login&languageCd=ENG&). (Registrar news and information)

## Americans with Disabilities Act (ADA)

Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation. For more information visit the [Office for Students with Disabilities](http://www.calstatela.edu/osd) home page.

## Academic Honesty

You are expected to familiarize yourself with the [Cal State LA Academic Honesty Policy](http://ecatalog.calstatela.edu/content.php?catoid=26&navoid=2646) including [Appendix D – Academic Honesty](http://ecatalog.calstatela.edu/content.php?catoid=26&navoid=2646) and [Appendix E - Student Conduct / Student Conduct Procedures](http://ecatalog.calstatela.edu/content.php?catoid=26&navoid=2647). All work you submit must be your own scholarly and creative efforts. At Cal State LA, plagiarism is defined as the act of using ideas, words, or work of another person or persons as if they were one’s own, without giving proper credit to the original sources.

Laboratory reports will be submitted through Turnitin (turnitin.com), an automated system which instructors use to compare each student’s assignment with web sites, as well as a database of student papers that grows with each submission.

After the assignment is processed, as an instructor I receive a report from turnitin.com that states if and how another author’s work was used in the assignment. Please visit the [Turnitin Student FAQ](https://www.turnitin.com/help_pages/student_faq.asp?r=87.6295589277586) page for more information.

# COURSE SCHEDULE

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| --- | --- | --- | --- |
| **­­Wk.** | **Date** | **Lab** | **Lab report** |
| Wk. 1 | Jan. 23 | Course objective and outline, Lab Check-in and safety rules |  |
| Wk. 1 | Jan. 25 | Pipetting exercises |  |
| Wk. 2 | Jan. 30 | Introduction to Spectroscopy | Lab Report 1 |
| Wk. 2 | Feb. 1 | Cellular fractionation | Lab Report 1 |
| Wk. 3 | Feb. 6 | Protein Quantification of Mitochondrial and Cytosolic Fractions | Lab Report 1 |
| Wk. 3 | Feb. 8 | Enzyme markers to establish purity | Lab Report 1 |
| Wk. 4 | Feb. 13 | **Discussion on writing reports and data presentation** |  |
| Wk. 4 | Feb. 15 | Photosynthesis | Lab report 2 |
| Wk. 5 | Feb. 20 | Bacterial protein fingerprinting: prepping lysates | Lab report 3 |
| Wk. 5 | Feb. 22 | Bacterial protein fingerprinting: Western blotting | Lab report 3 |
| Wk. 6 | Feb. 27 | Bacterial protein fingerprinting: Image analysis | Lab report 3 |
| Wk. 6 | Mar. 1 | Introduction: Handling fruit flies (*Drosophila melanogaster*) |  |
| Wk. 7 | Mar. 6 | Monohybrid and Dihybrid parental cross setup | Lab report 5 |
| Wk. 7 | Mar. 8 | Linkage and Epistasis parental cross setup | Lab report 5 |
| Wk. 8 | Mar. 13 | Dispose of parental Mono and Dihybrid adult flies  **Mendelian genetics problem solving lab** | Lab report 5 |
| Wk. 8 | Mar. 15 | Dispose of parental Linkage and Epistasis adult flies  **Corn Genetics** **(hand out)** | Lab report 5 |
| Wk. 9 | Mar. 20 | Monohybrid and dihybrid cross analysis of F1 offspring  Setup of F1 Monohybrid and Dihybrid self-crosses | Lab report 5 |
| Wk. 9 | Mar. 22 | Linkage and epistasis cross analysis of F1 offspring  Setup of F1 Linkage and epistasis self-crosses | Lab report 5 |
| Break | Mar. 27 to  Apr. 2 | SPRING BREAK- No Labs  Dispose of F1 generation adult flies **by IST** |  |
| Wk. 10 | Apr. 3 | Fruit fly genomic DNA extraction (PCR genotyping) | Lab report 4 |
| Wk. 10 | Apr. 5 | Setup of PCR genotyping | Lab report 4 |
| Wk. 11 | Apr. 10 | Monohybrid and Dihybrid cross analysis of F2 offspring | Lab report 5 |
| Wk. 11 | Apr. 12 | Linkage and Epistasis cross analysis of F2 offspring | Lab report 5 |
| Wk. 12 | Apr. 17 | Gel electrophoresis and gel imaging (PCR genotyping) | Lab report 4 |
| Wk. 12 | Apr. 19 | Reviewing |  |
| Wk. 13 | Apr. 24 | RNA extraction | Lab report 6 |
| Wk. 13 | Apr. 26 | RT-PCR setup | Lab report 6 |
| Wk. 14 | May 1 | Gel electrophoresis and gel imaging | Lab report 6 |
| Wk. 14 | May 3 | Review for final |  |
| Wk. 15 | May 8 | **Lab Final Exam: written and practical** |  |